TECHNICAL PAPER 376

TRAINING BATTALION COMMAND GROUPS IN SIMULATED COMBAT: IDENTIFICATION AND MEASUREMENT OF CRITICAL PERFORMANCES

Ira T. Kaplan and Herbert F. Barber

ARI FIELD UNIT AT FORT LEAVENWORTH, KANSAS

U. S. Army
Research Institute for the Behavioral and Social Sciences

June 1979

U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the Deputy Chief of Staff for Personnel

JOSEPH ZEIDNER
Technical Director

WILLIAM L. HAUSER
Colonel, U S Army
Commander

NOTICES

DISTRIBUTION: Primary distribution of this report has been made by ARI. Please address correspondence concerning distribution of reports to: U. S. Army Research Institute for the Behavioral and Social Sciences, ATTN: PERI-P, 5001 Eisenhower Avenue, Alexandria, Virginia 22333.

FINAL DISPOSITION: This report may be destroyed when it is no longer needed. Please do not return it to the U. S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: Technical Paper 376	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): TRAINING BATTALION COMMAND GROUPS IN SIMULATED COMBAT: IDENTIFICATION AND MEASUREMENT OF CRITICAL PERFORMANCES	5. TYPE OF REPORT & PERIOD COVERED: --
	6. PERFORMING ORG. REPORT NUMBER: --
7. AUTHOR(s): Ira T. Kaplan, Herbert F. Barber	8. CONTRACT OR GRANT NUMBER(s): --
9. PERFORMING ORGANIZATION NAME AND ADDRESS: U.S. Army Research Institute for the Behavioral and Social Sciences PERI-OL, 5001 Eisenhower Avenue, Alexandria, VA 22333	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 2Q763743A773
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Combined Arms Training Developments Activity, Fort Leavenworth, KS 66027	12. REPORT DATE: June 1979 13. NUMBER OF PAGES: 162
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office): --	15. SECURITY CLASS. (of this report): Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE: --

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

ARI-TP-376

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

--

18. SUPPLEMENTARY NOTES

--

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Battalion command group
Battle simulation
Command and control
Command group tasks
Command group training
Performance measurement

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The behavior of 23 battalion command groups was investigated in a simulated combat environment provided by the Combined Arms Tactical Training Simulator (CATTS). Thirteen mechanized groups performed a covering-force operation followed by an attack, and 10 nonmechanized groups performed a defense and an attack. Their performance was rated on items derived from the subtasks of the battalion command group ARTEP (Army Training and Evaluation Program). Fifteen subtasks were identified as critical, because they

(Continued)

408 010

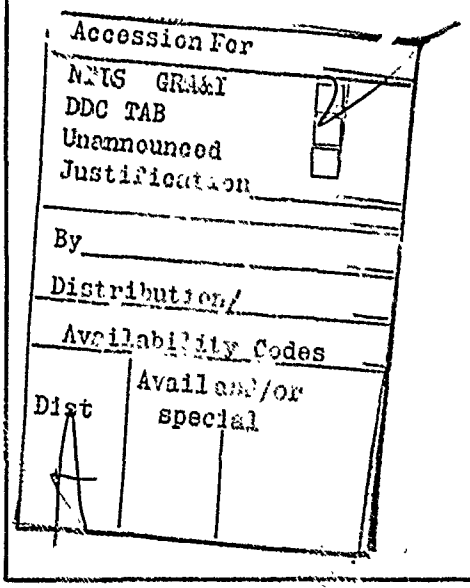
Item 20 (Continued)

or their elements were both low rated and highly correlated with ratings of overall effectiveness.

The four missions observed in this investigation were markedly different with respect to subtask criticality. All but 1 of the 15 critical subtasks were identified in the covering-force mission, 5 subtasks were critical in the mechanized attack, 1 in the defense, and 1 in the nonmechanized attack.

There were significant differences among ratings of the same command group by several observers, each of whom observed the exercise from a different point of view. These results indicate a need for further research (a) to develop more objective measures of performance and (b) to identify those subtasks for which the different perspectives of the raters should produce valid differences in performance ratings.

This report is written primarily for specialists in command/control simulation, although the military will be interested in the results.



TECHNICAL PAPER 376

TRAINING BATTALION COMMAND GROUPS IN SIMULATED COMBAT: IDENTIFICATION AND MEASUREMENT OF CRITICAL PERFORMANCES

Ira T. Kaplan and Herbert F. Barber

Submitted by:
Robert S. Andrews, Chief
ARI FIELD UNIT AT FORT LEAVENWORTH, KANSAS

Approved By:

A.H. Birnbaum, Acting Director
ORGANIZATIONS AND SYSTEMS
RESEARCH LABORATORY

Joseph Zeidner
TECHNICAL DIRECTOR

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES
5001 Eisenhower Avenue, Alexandria, Virginia 22333

Office, Deputy Chief of Staff for Personnel
Department of the Army

June 1979

Army Project Number
2Q763743A773

Command/Control

ARI Research Reports and Technical Papers are intended for sponsors of R&D tasks and other research and military agencies. Any findings ready for implementation at the time of publication are presented in the latter part of the Brief. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or Disposition Form.

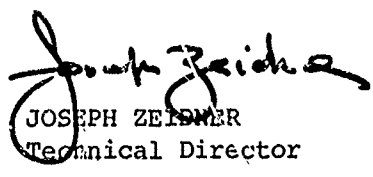
The Fort Leavenworth Field Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) conducts a research program in support of the Combined Arms Center (CAC), which includes the Combined Arms Training Developments Activity (CATRADA), the Combined Arms Combat Developments Activity (CACDA), and the Command and General Staff College (CGSC).

The CATRADA-related efforts encompass the identification of critical command group performance requirements at battalion, brigade, and division levels, the development of procedures for measuring command group performance, the development of procedures for measuring the training effectiveness of battle simulations, and the development of specifications for more effective command and control training systems through experimentation with current simulations.

The present investigation was performed in conjunction with two major advances in command and control training under development by CATRADA: The Command Group/Staff Module of the Army Training and Evaluation Program (ARTEP) and the Combined Arms Tactical Training Simulator (CATTS). An assessment methodology based on the ARTEP was used to gather data on the performance of battalion command groups in CATTS. ARI Technical Paper 353 describes the assessment of the first 27 groups; this report brings to 50 the total number of battalion command groups observed in a continuing study of critical performances in simulated combat.

Further, this report describes how the data were analyzed to identify performances that were commonly deficient and highly correlated with measures of overall effectiveness. This investigation was responsive to the objectives of Army Project 2Q763743A773 and to the special requirements of CATRADA concerned with the development of procedures for measuring command group performance and the identification of critical command group performance requirements. These special requirements are expressed in Human Resources Need 78-147, Development of Improved Command and Control Training Using Battalion Level and Above Simulation Technology.

LTC Richard C. Dickson and the staff of the Automated Command Training Division of the Battle Simulations Development Directorate, Combined Arms Training Developments Activity at Fort Leavenworth, aided in developing measures of command group performance, conducted the exercises, and provided the performance ratings on which this research is based.



JOSEPH ZEIDNER
Technical Director

TRAINING BATTALION COMMAND GROUPS IN SIMULATED COMBAT: IDENTIFICATION AND MEASUREMENT OF CRITICAL PERFORMANCES

BRIEF

Requirement:

The Combined Arms Center (CAC), Fort Leavenworth, Kans., is the center for all TRADOC (Training and Doctrine Command) command and staff simulations and for the command group/staff ARTEP (Army Training and Evaluation Program) at battalion, brigade, and division levels. Evaluation and further refinement of the command group training simulations and of the ARTEPs require the development of methods to measure ARTEP performances and the determination of the relative criticality of these performances.

Procedure:

Data were collected from 23 battalion command groups that participated in Combined Arms Tactical Training Simulator (CATTS) exercises. Thirteen mechanized groups performed a covering-force mission followed by an attack, and 10 nonmechanized groups performed a defense and an attack. The groups' performances were rated on 180 items derived from the subtasks of the Battalion Command Group ARTEP. These items were rated by seven controllers who conducted the exercise and by a monitor who observed the command group performances. The raters also evaluated the overall effectiveness of individual group members and of the command group as a whole.

Subtasks were identified as critical if they or their elements were both deficient (rated at or below the midpoint of the rating scale) and significantly correlated ($p < .01$) with overall effectiveness.

Findings:

The following 14 subtasks were identified as critical:

1-B, 2-A. Identify critical combat information and intelligence.

1-I. Plan fires.

2-B. Gather critical combat information and intelligence.

2-D. Disseminate critical combat information and intelligence.

3-G. Communicate/coordinate plans and orders.

6-B. Coordinate/communicate changes.

7-A. Modify fire support plan.

8-A. Determine critical place and time.

8-C. Concentrate/shift combat power in the defense or retrograde.

9-A. Arm and fuel the systems.

9-D. Integrate combat service support into the scheme of maneuver.

10-A. Defeat or suppress opposing force's electromagnetic intelligence effort.

11-A. Supervise compliance with task force order.

12-A. React to opposing force electronic warfare (EW).

The four missions observed in this investigation differed markedly in subtask criticality. All of the subtasks listed above except 6-B were critical in the covering-force mission. Five subtasks (2-B, 2-D, 3-G, 6-B, and 10-A) were critical in the mechanized attack, one (9-A) in the defense, and one (2-B) in the nonmechanized attack. Rater reliability (the internal consistency of a rater or group of raters) was low, but it increased when the scores from four or five raters were averaged. Individual raters also differed significantly from each other in their judgments of subtask performance.

The effects of mission type, rater reliability, and individual differences among raters should be controlled when diagnosing training requirements, comparing command groups, or evaluating training systems. Specifically, the same type of mission and the same groups of raters should be used when comparing command group performances. More objective measures of command group performance and identification of the factors that cause differences in ratings of the same command group by different observers would be desirable.

Utilization of Findings:

The data on the performance of battalion command groups in CATTS exercises gathered in this investigation were used in a preliminary Cost and Training Effectiveness Analysis (CTEA) for Army Training Battle Simulation System (ARTBASS), the proposed successor to CATTS. The performance measurement methodology developed in this research was also used in research on training brigade command groups in Computer Assisted Map Maneuver System (CAMMS) exercises and in the 1978 CAMMS/ARTS TEA (Computer Assisted Map Maneuver System in support of Army Training Study objectives

Training Effectiveness Analysis). In addition, this research provides a foundation for future investigations of command group performance and evaluations of command group training systems.

TRAININC BATTALION COMMAND GROUPS IN SIMULATED COMBAT: IDENTIFICATION AND MEASUREMENT OF CRITICAL PERFORMANCES

CONTENTS

LIST OF TABLES

LIST OF FIGURES

TRAINING BATTALION COMMAND GROUPS IN SIMULATED COMBAT: IDENTIFICATION AND MEASUREMENT OF CRITICAL PERFORMANCES

INTRODUCTION

Background

In recent years, time and resource constraints have provided increased impetus for development of more efficient military training systems. The Army Training and Evaluation Program (ARTEP) and the various battle simulations are notable examples of such systems.

The Combined Arms Training Developments Activity (CATRADA) at Fort Leavenworth, Kans., is responsible for developing ARTEPs and battle simulations for battalion, brigade, and division command groups (Battle Simulations and the ARTEP, 1977). At the battalion level, CATRADA has developed the Command Group/Staff Module of ARTEP 71-2 (Army Training and Evaluation Program . . . No. 71-2, 1977), which specifies the training objectives for the battalion commander and his staff.

In addition, CATRADA is developing four different battle simulations for training battalion command groups. Each simulation has its own unique capabilities and limitations. Pegasus is a manual control system for battalion and brigade command post exercises (CPX). Battalion Analyzer and Tactical Trainer for Local Engagements (BATTLE) is played on a terrain board with the aid of a minicomputer. Computer Assisted Map Maneuver System (CAMMS) exercises battalion or brigade and battalion command groups via terminals linked by telephone to a large, time-shared computer.

The most realistic and the most completely automated battle simulation available for training battalion command groups is the Combined Arms Tactical Training Simulator (CATTS). It is supported by a large, dedicated, computer and a full-time controller staff. CATTS is permanently located at Fort Leavenworth, but a remote version is being developed to provide exercises at a unit's home station.

These battle simulations and the command group ARTEP are subsystems within a larger system for training battalion commanders and their staffs. Courses taught in Army schools, as well as CPXs and field exercises conducted by the units themselves, are other elements of the command group training system.

The systems approach to training, as described in the Instructional Systems Development Model (Interservice Procedures, 1975), is the approved methodology to be followed in the development of military training systems. A simple outline of the systems approach, similar to Eckstrand's model (Eckstrand, 1964), will serve to place the present research in the context of a systems approach to training development.

The development of a training system can be described as a seven-stage process:

1. Define training objectives.
2. Develop measures of performance.
3. Derive training content.
4. Design training methods and materials.
5. Conduct training.
6. Evaluate trainee performance.
7. Provide feedback to modify content, methods, and materials.

The relationships among these stages are diagramed in the flow chart in Figure 1, and their relevance to the development of command group training is elaborated below.

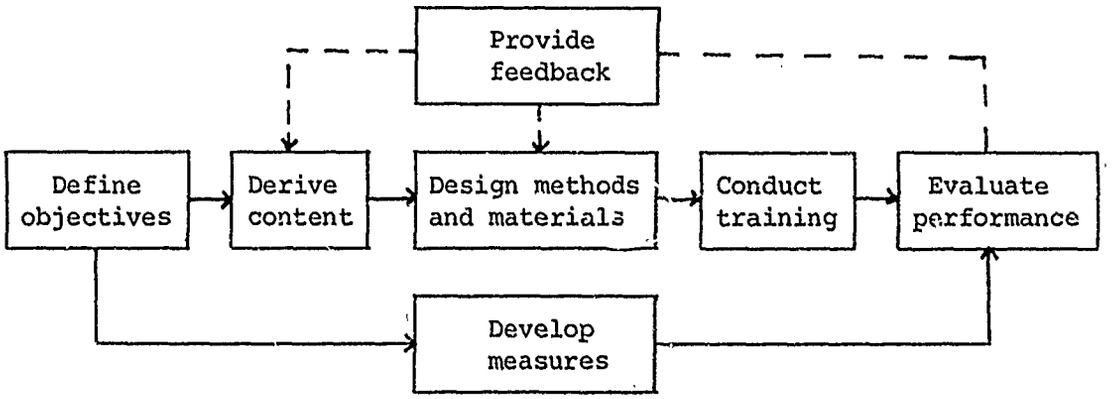


Figure 1. A systems approach to training development.

The Command Group/Staff Module of the ARTEP defines the objectives of the battalion command group training system. The module comprises 12 tasks which are divided into a total of 61 subtasks, a brief statement of the conditions under which each task and subtask is performed, and a general description of the performance standards for each task and subtask. The tasks include such broad actions as developing a plan based on mission, preparing and organizing the battlefield, seeing the battlefield during the battle, and concentrating/shifting combat power. The subtasks define more specific performances, e.g.: The task of seeing the battlefield during the battle is divided into four related subtasks: identify, gather, analyze, and disseminate critical combat information and intelligence.

The measurement instruments developed for this research are questionnaires answered by experienced evaluators who observe the command group's behavior in a simulated combat environment. The questionnaire items were derived from the command group ARTEP and from previous research

on the performance of battalion command groups in simulated combat (Barber & Kaplan, 1979). The previous research used a 3-point scale to rate the command groups' performance on ARTEP subtasks; however, the raters generally avoided the low end of the scale. Therefore, a 5-point rating scale was introduced in the present investigation to encourage finer discriminations in performance. Also, many questions that could be answered yes or no were added to the observation form to provide more specific information about the components of subtask performance.

The training content should be derived from and directed toward satisfying the defined objectives. Verbal content is chosen from books, lectures, and courses. Battle simulation content is specified by the exercise scenarios, which determine the terrain on which the simulated battle is fought, the mission that the command group is assigned, and the ARTEP tasks and subtasks that must be performed to accomplish the mission.

The methods and materials for training battalion commanders and staffs include lectures, field manuals, exercises, and battle simulations. These simulations are used both to conduct training and, with the aid of performance measures based on the ARTEP, to evaluate the effectiveness of previous training. The feedback that an individual command group receives about its weaknesses enables it to modify its own training program to address those weaknesses. Knowledge of the weaknesses common to many command groups enables the Army to improve the total training system.

Purpose

The present investigation was concerned with Steps 2 and 7 in the system development process: developing performance measures from the training objectives and providing feedback to improve training content, methods, and materials. This effort contributed directly to two aims of the ARI Field Unit's research on command and control training: (a) to identify critical command group performance requirements at battalion and higher command levels and (b) to develop ways of measuring these performances through the use of battle simulations. More specifically, the purposes of this investigation were as follows:

1. To validate the revised and expanded battery of performance measures by using it to evaluate (a) specific command group performances and (b) the overall effectiveness of individual staff members and the command group as a whole.

2. To verify and extend the results of previous research by using the refined assessment procedure to further identify and to describe those command group performances that are most important for training in terms of (a) low performance ratings and (b) high correlations with overall effectiveness ratings.

METHOD

Battalion Command Groups

Data were collected from 13 mechanized and 10 nonmechanized units stationed in the continental United States. The mechanized units included 5 infantry, 3 armor, and 5 cavalry battalions. The nonmechanized units were all infantry battalions. As Table 1 shows, 3 mechanized infantry battalions were National Guard units, and all the other units were Active Army.

Table 1

Number of Command Groups

Type of unit	Active Army	National Guard
Mechanized		
Infantry	2	3
Armor	3	0
Cavalry	5	0
Nonmechanized		
Infantry	10	0

The battalion command group typically comprised the commander, S1, S2, S3, S4, an air liaison officer (ALO), a fire support coordinator (FSCOORD), an operations sergeant, intelligence sergeant, assistant S2 and/or S3 air, fire support noncommissioned officer (NCO), and one or two radio/telephone operators.

Exercises

Each command group was observed during performance of two missions in the CATTS facility at Fort Leavenworth. As Table 2 indicates, the particular missions assigned to a group depended on the type of unit it commanded: Mechanized units performed a covering-force operation followed by a daylight attack as part of a larger force; nonmechanized units first performed a defense and then a nonilluminated, nonsupported night attack. Differences in mobility and probable real world missions determined the types of missions assigned. Active Army groups conducted their two missions during a 3-day exercise. National Guard groups performed one mission per day during a 2-day, weekend exercise. The events scheduled for each type of exercise are outlined in Appendix A.

Table 2

Type of Mission

Type of unit	Mission 1	Mission 2
Mechanized	Covering force	Attack
Nonmechanized	Defense	Attack

Simulation System

The battlefield environment was simulated by the CATTS, which provides a computer-driven exercise to train maneuver-battalion commanders and their staffs in the control and coordination of combined-arms operations. CATTS simulates the actions of units in combat, moves elements on and about the battlefield, calculates intervisibility and detection between forces, calculates weapon-to-target ranges, and the effects of weapons employment; it also maintains the status of personnel, equipment, ammunition, and fuel for friendly and enemy forces. Speed of movement, line of sight, and weapons effects are affected by changes in weather, terrain contour, soil type, suppressive fires, and personnel and equipment status.

The CATTS exercise is conducted in a real-time, free-play mode. Within the prescribed tactical situation, the battalion commander can employ battalion assets in any manner deemed appropriate. The only constraints are the assets available to the battalion and the actions of the enemy commander.

In this research, the command group, except the S1 and S4, occupied a simulated tactical operations center (TOC); the S1 and S4 were in another area, designated as the combat trains. The players (the battalion command group) in both areas were provided with communications equipment normally found in a maneuver battalion. They could communicate with higher, lower, and adjacent units (played by controllers) in any manner consistent with Army procedure and with the simulated location of the various units: face to face, by telephone or radio, and by written message.

Figure 2 illustrates the communications among the players, the controllers, and the computer. Most communication took place by radio and telephone. The battalion command group had seven radio nets (actually hard-wired) with appropriate alternate frequencies. The nets included the following: the brigade command, brigade intelligence, brigade administration/logistics, battalion command, fire support, and air support nets. In addition, the command group also had a RATT (radioteletype)

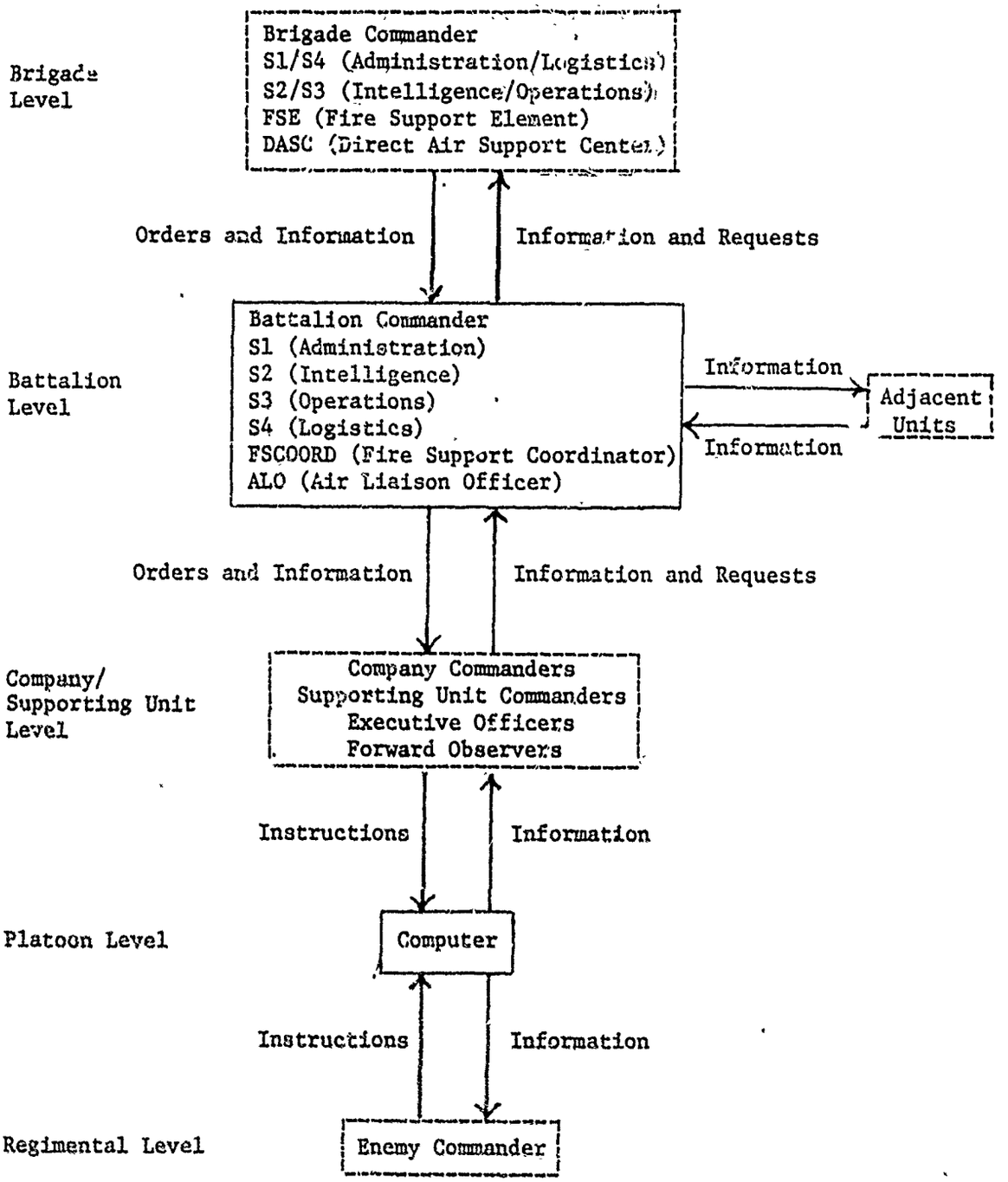


Figure 2. Communication between controller and player positions in CATTS. (Controller positions are enclosed by broken lines.)

unit and field telephones, when appropriate. The sounds of enemy jamming, battle, and engine and generator noise were generated during the exercise to add to the realism of the experience.

Controllers

A team of controllers, permanently assigned to CATTS, mediated between the players and the computer. The control group included a chief controller who played the role of brigade commander, a brigade S1/S4 controller who also played the roles of service-support-unit commander and executive officer, a brigade S2/S3 controller, four maneuver- and supporting-unit commanders, a fire support controller, two forward observers, a direct air support controller representing DASC, and a threat controller. The DASC was played by a different Air Force officer each time.

The monitor was an adjunct member of the control group who observed the command group during the exercise and provided feedback to the players during the postgame critique. This position was a rotating assignment among faculty members of the Command and General Staff College who had served as battalion commanders or staff members and held the rank of lieutenant colonel.

Table 3 lists the members of the control group. Three controllers, identified as interactors, input orders to the computer through a control console: (a) the command and control interactor relayed orders from the battalion command group to the maneuver units modeled in the computer; (b) the fire support interactor input orders to the artillery and air support units; and (c) the threat interactor, working independently, controlled the enemy force.

The results of simulated movements and engagements were displayed on television screens to the controllers, who transmitted relevant information to the players via radio or telephone. Except for the threat interactor and the monitor, all controllers acted the roles of higher, lower, or adjacent unit personnel. In addition to their other functions, eight controllers also filled out observation forms on which they evaluated the command group's performance on the areas designated in Table 3.

Performance Measures

Documentation of the observation forms used to evaluate the performance of battalion command groups in simulated combat is one of the principal objectives of this report. These forms constitute a source of test items that exercise directors or battalion and brigade commanders can use. The items can also be used by researchers to study command group training and performance. The general format of the observation forms is illustrated by the fire support questionnaire in Appendix B. The specific items from all the observation forms are included in the summary of results in Appendix C.

Table 3

CATTS Control Group

Position	Rank	Performance observed
Chief controller	LTC	
Brigade S1/S4	MAJ	Administration and logistics
Brigade S2/S3	MAJ	Intelligence and operations
Command and control interactor	CPT	Intelligence and operations
Company commander controller	MAJ	Intelligence and operations
Company commander controller	CPT	Intelligence and operations
Company commander controller	CPT	Intelligence and operations
Unit first sergeants	SSG	--
Fire support interactor	CPT	--
Artillery controller	LTC	Fire support
Artillery controller	CPT	--
Artillery controller	SSG	--
Direct air support controller	CPT to LTC	--
Threat interactor	CPT	--
Monitor	LTC	ARTEP subtasks

Although still subject to refinement, especially with respect to increased objectivity, the present observation forms were superior to those previously employed. The major improvements, based on extensive experience using the earlier forms, were the introduction of a 5-point scale for rating the performance of ARTEP subtasks and the addition of many specific questions that were answered yes or no. The 5-point rating scale permitted finer discriminations than the 3-point scale previously used, and the yes/no questions provided more detailed information about the components or elements of subtask performance.

Four different observation forms were filled out by the evaluators:

1. A form concerned with administration and logistics was completed by the brigade S1/S4 controller.

2. Intelligence and operations forms were completed by the brigade S2/S3 controller and by the controllers who played company commanders.

3. A fire support form was completed by the fire support controller.

4. An observation form covering all the preceding areas, in somewhat less detail, was completed by the monitor.

Each observation form had two or three versions, including a version appropriate to the particular mission that was played. The S1/S4, FS, and monitor's forms had one version for the covering force or defense and another version for the mechanized or nonmechanized attack. The intelligence and operations form had one version for the covering force, another for the defense, and a third for the mechanized or nonmechanized attack. Most items on a given form were the same in both or all three versions, but some items were unique to the mission.

The performances evaluated by the brigade S1/S4 controller included subtasks and elements of subtasks concerned with providing supplies and maintaining equipment before and during the battle (Subtasks 3-J, 3-K, 9-A, 9-B), supporting the troops (9-C), and integrating combat service support (CSS) into the scheme of maneuver (9-D). The S1/S4 controller also rated the overall effectiveness of the battalion S1 and S4 in comparison with those of previous command groups.

The brigade S2/S3 controller and the company commanders evaluated subtasks and elements concerned with intelligence preparation of the battlefield (1-B, 2-A, 2-B, 2-C, 2-D), analyzing friendly capabilities (1-D), selecting routes and positions (1-F, 1-G, 1-H), organizing for combat (3-C), communicating plans and orders (3-D, 3-F, 3-G), seeing the battlefield during the battle (5-B, 5-C, 5-D), troop leading during the battle (11-A), communicating changes (6-B), concentrating combat power (8-A, 8-B, 8-C, 8-D), and reacting to enemy electronic warfare (10-A, 12-A). They also rated the overall effectiveness of the battalion S2, S3, and the command group as a whole in comparison with previous S2s, S3s, and command groups.

The fire support controller evaluated the fire support plan (1-I), priority of fires (1-J), fire support coordination (1-L), modification of the fire support plan during the battle (7-A), and the overall effectiveness of the battalion fire support element in comparison with that of previous groups.

The monitor evaluated all the above types of performance by rating subtasks of the command group ARTEP. The only subtasks the monitor did not rate were those that were not played in the exercise and those he or she could not observe. The monitor also evaluated the degree to which the mission was accomplished and the overall effectiveness of the battalion commander and of the command group as a whole. Not having had as much experience observing command groups as the permanent controllers, the monitor did not rate them in comparison with previous groups, but used the 5-point performance scale instead.

The scales that were used to rate performance, overall effectiveness, and mission accomplishment are listed below:

The alternative responses on the 5-point performance scale were defined as follows:

1. Completely overlooked, forgotten
2. Major deficiencies
3. Minor deficiencies
4. Satisfactory
5. Excellent.

The overall effectiveness of the command group as a whole and of its individual members was rated in comparison with previous command groups and their members on the following scale:

1. One of the worst
2. Worse than average
3. Average
4. Better than average
5. One of the best.

The alternative responses for the monitor's evaluation of mission accomplishment were these:

1. Failed to accomplish any part of the mission
2. Failed to accomplish most of the mission
3. Accomplished about half of the mission
4. Accomplished most of the mission
5. Accomplished all of the mission.

Data Analysis

The primary objectives of the data analysis were to identify those performances that were deficient and those that were highly correlated with ratings of overall effectiveness. Performances were designated as deficient when their average scores were less than or equal to the midpoint of the rating scale. For performances rated on a 5-point scale, the criterion score was 3.0. For items answered yes or no, the criterion score was 50% yes. Most of the yes/no items were worded so that a "yes" response was correct, but a few questions were phrased so that "no" was the desired response. Thus, the general definition of deficient performance for yes/no items was an average score less than or equal to 50% correct.

A correlation was considered high when it was statistically significant at the .01 level by the one-tailed test. To reach this level of significance, the coefficient of correlation had to exceed .63, because 13 was the largest number of cases on which a correlation was based. The correlation had to be even larger when it was based on fewer cases. Pearson r's were computed for the scaled items and point biserial correlations for the yes/no items. The .01 criterion of significance was chosen in preference to the less stringent .05 level because of the large number of correlation coefficients (over 2,000) that were computed. About 100 would be significant by chance at the .05 level versus about

20 at the .01 level. The one-tailed test was used because only a positive relationship was expected between correct performance and overall effectiveness.

One problem with using correlation as a measure of criticality is that the size of the correlation between two variables decreases when the range of either variable is restricted (Welkowitz, Ewen, & Cohen, 1976). For example, if every S4 determined the status of equipment before the battle, there would be no correlation between performance of this task and the S4's overall effectiveness ratings, even though failure to perform the task might have harmful consequences. There would be a similar absence of correlation if no S4 ever determined the status of equipment before the battle. In fact, however, lack of variation was not a serious problem in this study because the typical case of restricted range occurred when the task was usually performed correctly.

It can be argued that a task that is performed correctly by a given population is not important for training in that population. Scandura (1977) made a related point when he wrote that professional competence does not have to be analyzed to the level of elementary skills. For example, all accountants can add, so arithmetic ability is not an important variable for distinguishing among individuals within the population of trained accountants. Similarly, the tasks that were usually performed correctly in the present investigation are not critical for training incumbent command groups. This argument is consistent with the ARTEP philosophy, which advocates training to correct deficiencies.

The data for each of the four missions were analyzed separately. First, mean scores were calculated for the items that were rated by several observers, i.e., the intelligence and operations items that were rated by the brigade S2/S3 and the company commanders, the overall effectiveness ratings for the battalion S2 and S3 rated by the same controllers (brigade S2/S3 and company commanders), and the overall effectiveness ratings for the whole command group provided by the same controllers plus the monitor. These ratings were averaged over observers to obtain a mean score for the command group on each item. Then the scores for every command group on all four observation forms (administration and logistics, intelligence and operations, fire support, and the monitor's form) were analyzed to produce the two desired measures of performance for each item:

1. The mean rating averaged over all the command groups that played a given mission.

2. The correlations between performance on the item and the overall effectiveness ratings, calculated across all the command groups that played a given mission.

In addition to the analysis of ratings and correlations for every item on the observation forms, analyses of variance were performed to compare the relative difficulty of the four different missions, and measures of interrater reliability were computed for the items that were rated by several observers.

RESULTS

The results of this investigation are described below under three major headings: (a) Performance Deficiencies, (b) Correlates of Effectiveness, and (c) Critical Performances. Under each heading, four sets of command group performances are considered in turn: (a) administration and logistics, (b) intelligence and operations, (c) fire support, and (d) the subtasks rated by the monitor. Within each of these sets, the results are presented for each of the four missions: (a) covering force, (b) mechanized attack, (c) defense, and (d) nonmechanized attack. A complete summary of the mean ratings and correlations for every item is given in Appendix C.

Performance Deficiencies

A given performance was considered deficient when it was rated incorrect for 50% or more of the command groups in the case of items answered yes or no, or when its average score was less than or equal to 3.0 in the case of items rated on a 5-point scale. All the deficient performances are listed in Tables 4 through 7.

A performance that was deficient in one mission was not necessarily deficient in another. To make the deficient performances stand out more clearly, satisfactory performance scores are not included in Tables 4 through 7 (but are given in Appendix C). In these tables, the mean score for each item is entered in the column that corresponds to the mission in which performance was deficient. The entries with decimal points are mean scores on the 5-point scale. Percentage entries indicate yes responses to items that were answered yes or no. The entry N/A (not applicable) means that there is no score because the item did not appear on the observation form for that mission.

Items that correspond to ARTEP subtasks in Tables 4 through 6 are identified by the subtask label in parentheses after the item. The elements of a subtask are listed before it. When elements of a subtask were deficient but the overall subtask was not, the subtask label is given before the elements.

Administration and Logistics. Table 4 shows that the deficiencies in administration and logistics had to do with providing supplies and equipment during the battle (Subtask 9-A) and integrating combat service support into the scheme of maneuver (Subtask 9-D). Four performances

were deficient in the covering-force operation (Items 6d, 6e, 9b, and 9c on the observation form), none in the mechanized attack, one in the nonmechanized defense (6d), and one in the nonmechanized attack (6g). Obviously, the specific deficiency in the use of transportation assets (9b) contributed to the more general weakness in the integration of CSS into the scheme of maneuver (9c) in the covering force.

Table 4

Deficiencies in Administration and Logistics

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
6. In providing supplies and equipment to arm and fuel the system during the battle: (9-A)				
d. Did the S4 coordinate with the S2 so he knew the enemy's capabilities?	50%	-	33%	-
e. Did the S4 keep his higher appropriately informed of his activities?	45%	-	-	-
g. Did the S4 effectively utilize his direct support assets?	-	-	-	44%
9. In terms of integrating CSS into the scheme of maneuver:				
b. Were transportation assets used to fit movement of CSS resources to the scheme of maneuver?	46%	-	-	-
c. How effectively was CSS integrated into the scheme of maneuver? (9-D)	3.00	-	-	-

Note: CFO = covering-force operation.
CSS = combat service support.

Intelligence and Operations. Table 5 lists all the items that were deficient, according to the average ratings of the S2/S3 and company commander controllers. There were deficiencies in 8 of the 10 categories of items. (The two exceptions are B. Friendly considerations and C. Organize for combat.) Because the items within each category varied from one mission to another, a given item on the observation form for one mission generally had a different number on another form. For ease of reference, therefore, the items in Table 5 have been renumbered consecutively within each category.

Six items were deficient in at least three of the four missions:

A7. The intelligence collection plan was not properly prepared.

G1. The command group sometimes made an unwarranted assumption that all team commanders were monitoring their radios for changes. (This was an instance of a "yes" response being wrong, indicating incorrect behavior.)

I1. There was too much radio communication. (Another case where yes meant wrong.)

I2. There were security violations during radio traffic. (A third such case.)

I5. Spare frequencies were not used correctly

The largest number of deficiencies occurred in the covering-force operation (33) and the next largest in the mechanized attack (20). There were relatively few deficient performances in the defense (8) or in the nonmechanized attack (5). The greatest concentrations of deficiencies were in:

Category A. Intelligence preparation of the battlefield.
D. Communicate/coordinate plans and orders.
H. Concentrate/shift combat power.
I. Enemy electronic warfare considerations.

Categories A, D, and I were weak in the covering-force and mechanized attack; Category H, mainly in the covering-force.

Fire Support. The deficiencies in fire support are labeled in Table 6 as they were on the observation form. Only Item 1a, planning the utilization of heavy mortars, was deficient in several types of missions. All the other deficiencies, which were related to determining the initial priority of fires (Subtask 1-J) and modifying the fire support plan (Subtask 7-A) were confined to the covering force. Items 4a and 4b were parts of the overall performance encompassed by Item 4c.

Table 5

Deficiencies in Intelligence and Operations

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
A. Intelligence preparation of the battlefield.				
1. Was the enemy's scheme of maneuver and fire support identified?	41%	48%	-	-
2. Was the enemy's ability to attack by air identified?	45%	N/A	46%	N/A
3. Was the enemy's nuclear capability identified?	32%	N/A	36%	N/A
4. Was the enemy's chemical capability identified?	39%	N/A	44%	N/A
5. Overall, how well did the command group identify critical combat information and intelligence? (1-B, 2-A)	2.76	2.97	-	-
6. Were all GSR[a] elements effectively utilized?	-	10%	-	-
7. Was the TF[a] intelligence collection plan properly prepared, and did it reflect analysis by the battalion S2 of tasking responsibilities?	2.67	3.57	2.74	2.53
8. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/ appropriate sources? (2-B)	2.71	2.73	-	-

Note. N/A = not applicable.

[a]CFO = covering-force operation.
GSR = ground surveillance radar.
TF = task force.

Table 5 (Continued)

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
9. Was relevant information (e.g., minefields) from higher headquarters and adjacent units disseminated to company commanders?	2.85	2.98	-	-
10. Were company commanders given an estimate of specifically what they would be facing?	36%	-	-	-
11. Overall, did the command group disseminate combat information and intelligence that was event-oriented and usable to the recipient? (2-D)	2.87	-	-	-
D. Communicate/coordinate plans and orders.				
1. Were company commanders given instructions on actions to be performed if jamming occurs?	-	-	-	49%
2. Were effective alternate means of communication developed in case of lost commo?	32%	44%	-	-
3. Was wire utilized as an effective means of communication?	N/A	35%	N/A	-
4. Did the command group develop a communication plan that satisfies the communications requirements of the specific mission, provides for COMSEC,[a] specifies alternative means of communication, and insures operation of MIJI[a] plan? (3-F)	2.79	2.74	-	-

[a]COMSEC = communications security.
MIJI = measuring, intrusion, jamming, and interference.

Table 5 (Continued)

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
5. Did all elements understand what they were to do without extensive questioning?	46%	-	-	-
6. Did the operation order contain enough information for attached units?	2.86	-	-	-
7. Was sufficient time allowed task force elements for their troop leading procedures?	44%	44%	-	-
8. Overall, were the orders appropriate, clear, concise, and did they contain essential information; were they issued so as to allow TF elements maximum time to go through troop leading procedures; and were they coordinated with proper agencies? (3-G)	2.79	3.00	-	-
E. See the battlefield during the battle.				
1. How well did the command group disseminate information and intelligence that was event-oriented, usable to the recipient, accurate, and within a time frame that permitted the recipient to react? (5-D)	3.00	-	-	-
F. Troop lead during the battle. (11-A)				
1. Were all attached combat units adequately controlled/ monitored during the conduct of the exercise?	2.94	-	-	-

Table 5 (Continued)

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
G. Coordinate/communicate changes. (6-B)				
1. Did the command group sometimes assume all commanders were monitoring radios for changes?	56%	64%	56%	66%
H. Concentrate/shift combat power.				
1. How well did the command group read the battlefield and determine the precise place and time for maximum combat power needed to be employed? (8-A)	2.60	-	-	-
2. When the enemy committed itself, did the command group adequately redeploy forces?	2.43	N/A	-	N/A
3. Were tactical decisions made consistent with the time-distance relationship?	39%	-	-	-
4. Overall, how well did the command group concentrate its organic/attached/DS[a] assets according to the weapons capabilities and movement of the enemy force? (8-B/C)	2.76	-	-	-
5. Overall, how well did the command group direct organic/supporting forces to conduct economy of force operations in the thinly held areas (when concentrating combat power)? (8-D)	2.80	3.00	-	-

Note. N/A = not applicable.

[a]DS = direct support.

Table 5 (Continued)

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
I. Enemy EW[a] considerations.				
1. Was there too much communication?	88%	73%	84%	-
2. Did security violations occur during radio traffic?	54%	61%	50%	61%
3. Overall, how well did the command group adhere to communications and electronic security measures? (10-A)	2.81	2.81	-	-
4. Was a MIJI report promptly submitted to higher headquarters using secure means of communication?	-	40%	-	-
5. Did the command group direct a switch to spare frequency as a last resort using proper authentication techniques?	23%	36%	34%	43%
6. Overall, how well did the command group recognize and react to enemy electronic warfare? (12-A)	2.82	2.85	-	-
J. Other.				
1. Was there sufficient intrastaff coordination between 2/3 and 1/4?	41%	38%	-	-
2. Was there sufficient coordination between NCS[a] and 2/3?	43%	49%	-	-

[a]EW = electronic warfare.
NCS = net control station.

Table 5 (Continued)

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
3. How well did the command group apply the time-distance relationship while maneuvering task force elements?	2.86	-	-	-
4. Did the task force maneuver elements become decisively engaged because of battalion action?	56%	N/A	N/A	N/A

Note. N/A = not applicable.

Table 6

Deficiencies in Fire Support

Observation form item	Mechanized		Nonmechanized	
	CFO[a]	Attack	Defense	Attack
1. Plan use of organic/ attached and nonorganic fires. (1-I)				
a. Did fire plan effectively utilize heavy mortars?	20%	-	40%	50%
2. Determine priority of fires. (1-J)				
a. Was priority of fires given to appropriate TF element(s) to support scheme of maneuver?	50%	-	-	-
b. Was suppression of fires considered?	50%	-	-	-
4. Modify fire support plan.				
a. During the battle, was priority of fires supporting new scheme of maneuver immediately communicated to supporting and supported units?	50%	-	-	-
b. Were requests for immediate fire support received and assigned to appropriate fire support agencies?	50%	-	-	-
c. Overall, how well did the command group perform relative to the standard? (7-A)	2.90	-	-	-

[a]CFO = covering-force operation.

Monitor's Ratings. The subtasks evaluated by the monitor are labeled in Table 7 as they were on the monitor's observation form and in the command group ARTEP. Only four subtasks were deficient in three of the four missions: 2-C (analyze enemy), 2-D (disseminate critical intelligence), 3-G (communicate/coordinate plans and orders), and 12-A (react to enemy electronic warfare). However, 12 subtasks, including 2-C, 2-D, and 3-G, were deficient in both the covering-force and the mechanized attack; these were primarily the subtasks concerned with intelligence before (2-A, 2-B, 2-C, 2-D) and during (5-A, 5-B, 5-C, 5-D) the battle, and with managing combat service support (9-A, 9-B, 9-C). Altogether, 19 items were deficient in the covering-force and 15 in the mechanized attack, compared to just 3 in the defense and 3 in the nonmechanized attack.

Summary. Figure 3 shows the percentage of items that were judged deficient in each type of mission. The four percentages for each mission refer to (a) administration and logistics rated by the S1/S4 controller, (b) intelligence and operations rated by the S2/S3 and company commander controllers, (c) fire support rated by the fire support controller, and (d) subtasks rated by the monitor. Every evaluator reported the greatest percentage of deficiencies in the covering-force operation. The next highest percentages of deficiencies were in the mechanized attack, specifically, in the intelligence and operations items and in the monitor's ratings. There were relatively few deficiencies in the defense and the nonmechanized attack.

The preceding results indicate that the mechanized attack was performed better than the covering-force and that both nonmechanized missions were performed better than the mechanized missions. These relationships were generally supported by further analysis of the data. Table 8 summarizes the mean scores on the ARTEP subtasks evaluated by each rater for each mission.

A higher score means the subtask was performed better. An analysis of variance was done for each set of ratings. In Kirk's (1968) terminology, it was a split plot factorial design with repeated measures over two factors, mission (first versus second) and subtasks, with type of unit (mechanized versus nonmechanized) a grouping factor.

The ANOVAs (analysis of variance) in Appendix D show that the second mission was significantly better than the first ($p < .05$) for the administration and logistics ratings and for fire support. The nonmechanized groups scored significantly higher than the mechanized ones only on the intelligence and operations subtasks ($p < .001$). Planned comparisons (t tests) showed that the mechanized attack was performed better than the covering-force operation for all four sets of subtasks: administration and logistics ($p < .01$), intelligence and operations ($p < .05$), fire support ($p < .001$), and the monitor's ratings ($p < .05$). The nonmechanized attack was better than the defense only for fire support ($p < .001$). Because the attack was always the second mission, it is not possible to decide whether it was an

Table 7

Deficiencies Observed by the Monitor

Observation form item	Mechanized		Nonmechanized	
	CFO[a]	Attack	Defense	Attack
1. Develop plan based on mission.				
B. Identify critical intelligence.	-	2.73	-	-
I. Plan use of organic/ attached and nonorganic fires.	2.75	-	-	-
2. Initiate intelligence preparation of the battlefield.				
A. Identify critical intelligence.	2.55	2.67	-	-
B. Gather critical intelligence.	2.55	2.83	-	-
C. Analyze enemy.	2.64	2.92	-	3.00
D. Disseminate critical intelligence.	2.73	2.91	2.88	-
3. Prepare and organize the battlefield.				
E. Plan organic, attached, and nonorganic supporting fires and determine priority.	-	3.00	-	-
F. Develop a communication plan.	-	2.71	-	-
G. Communicate/coordinate plans and orders.	2.73	2.73	2.83	-
I. Employ active/passive security measures.	2.60	-	-	-

[a]CFO = covering-force operation.

Table 7 (Continued)

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
5. See the battlefield during the battle.				
A. Identify critical intelligence.	2.75	2.70	-	-
B. Gather critical intelligence.	2.92	2.80	-	-
C. Analyze enemy.	2.42	3.00	-	-
D. Disseminate critical intelligence.	3.00	2.89	-	-
7. Employ fires and other combat assets.				
A. Modify fire support plan.	2.92	-	-	-
B. Employ fires.	3.00	-	-	-
8. Concentrate/shift combat power.				
A. Determine critical place and time.	2.92	-	-	2.83
B/C. Concentrate/shift combat power.	2.83	-	-	-
9. Manage combat service support assets.				
A. Arm and fuel the systems.	3.00	3.00	-	-
B. Fix the system.	3.00	2.89	-	-
C. Support the troops.	3.00	3.00	-	-
D. Integrate CSS[a] into scheme.	-	-	-	-

[a]CSS = combat service support.

Table 7 (Continued)

Observation form item	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
12. React to situations requiring special actions.				
A. React to enemy electronic warfare.	3.00	-	3.00	2.00

Table 8

Mean Ratings on ARTEP Subtasks

Item	Mechanized		Nonmechanized	
	CFO[a]	Attack	Defense	Attack
Administration and logistics	2.9	3.7	3.4	3.7
Intelligence and operations	2.9	3.1	3.6	3.5
Fire support	3.2	3.9	3.4	4.1
Monitor	3.1	3.4	3.2	3.3

[a]CFO = covering-force operation.

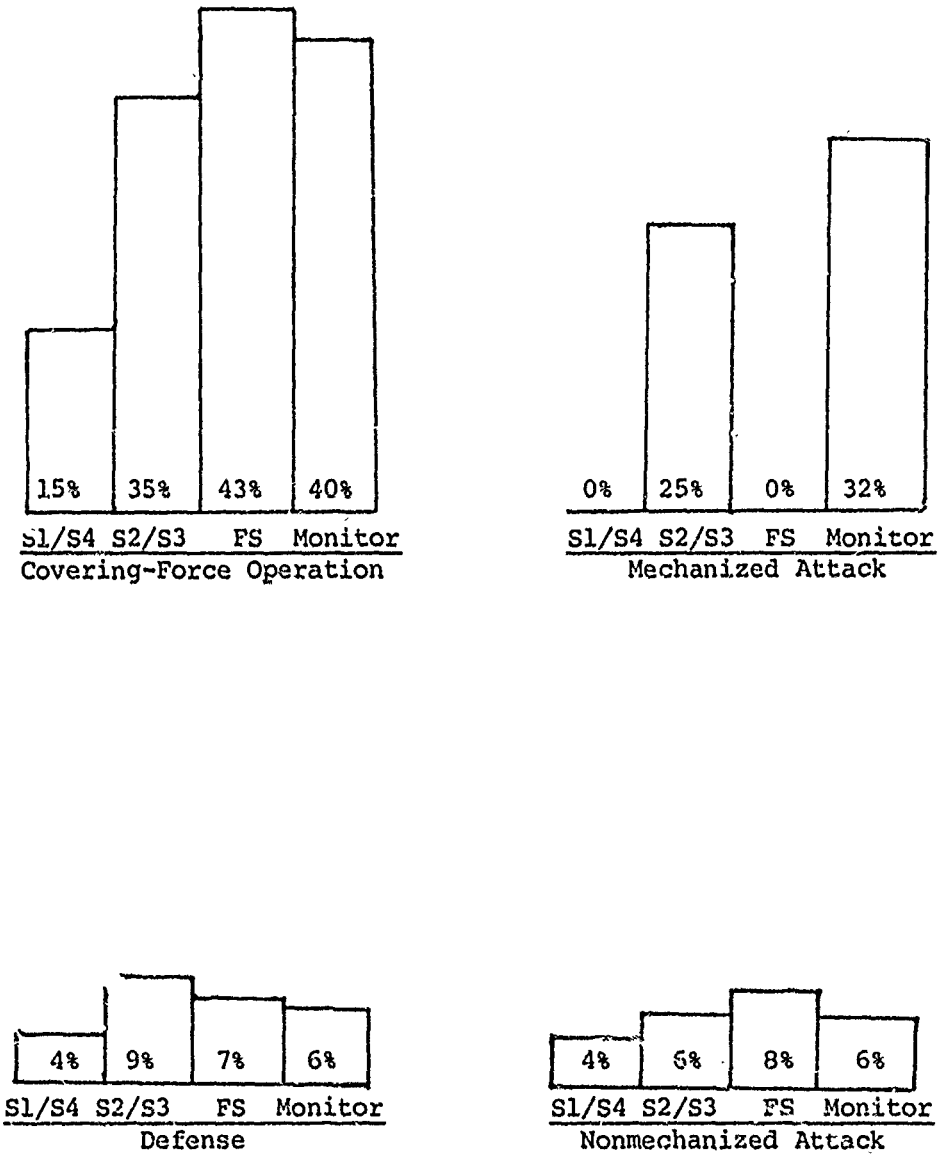


Figure 3. Percentage of items rated deficient by each rater for each type of mission.

easier mission to perform or whether the command groups improved with practice from the first mission to the second. It is probable, however, that the covering-force operation was more difficult than the defense, because those two missions were always performed first.

Correlates of Effectiveness

Eight measures of effectiveness were obtained in this investigation: The overall performance of the S1 and of the S4 was rated by the S1/S4 controller, the S2 and S3 were rated by the S2/S3 controller and the company commander controllers, the utilization of fire support assets (FS) was rated by the fire support controller, the battalion commander (Cdr) and mission accomplishment (Msn) were rated by the monitor, and the overall effectiveness of the command group as a whole (CG) was rated by the S2/S3 and company commander controllers and by the monitor.

Intercorrelations Between Effectiveness Ratings. Tables 9 through 12 show the intercorrelations among the measures of effectiveness for each mission. Most of the correlations in Tables 9 and 10 are based on 13 cases; most of those in Tables 11 and 12 are based on 10 cases. Correlations that are significant beyond the .01 level are marked with asterisks. The statistical significance of a correlation depends on the number of cases on which it is based as well as on its size. Therefore, a given correlation may not be significant even though it is larger than a significant correlation that is based on more cases.

As would be expected, the rating of the command group as a whole was the measure most highly correlated with the other measures of effectiveness. Of the 11 significant correlations (in Tables 9 through 12) 8 involved the command group rating. The most consistently related pair of variables were the S3 and command group ratings, which were significantly correlated in all four missions. On the other hand, only one of the monitor's effectiveness ratings was significantly correlated with another effectiveness rating, viz., mission accomplishment with command group effectiveness in the defense. Probably the reason that no other monitor's ratings were significantly correlated was that every command group was rated by a different monitor. Variation in personal evaluative criteria from one monitor to another probably reduced the correlations between effectiveness ratings. The FS rating was not significantly correlated with any other measure of effectiveness, which probably reflects a lack of integration between fire support and the other command group functions.

Administration and Logistics. Table 13 shows that most of the administrative and logistics (admin/log) tems significantly correlated with overall effectiveness ratings were correlated with the rating of the S4. This result is plausible, because most items refer to S4 functions. There were fewer significant correlations in the nonmechanized missions than in the mechanized ones, because the performance ratings

Table 9

Intercorrelations Between Effectiveness Ratings for the Covering-Force Operation

	S2	S3	S4	FS	Cdr	Msn	CG
S1	.24	.47	.87**	.37	.41	.14	.73*
S2		.53	.28	.27	-.61	-.11	.38
S3			.36	.37	-.21	-.38	.68*
S4				.37	.40	.27	.66*
FS[a]					-.15	.24	.20
Cdr[a]						.23	-.11
Msn[a]							-.31

[a]FS = utilization of fire support asset.
Cdr = battalion commander.
Msn = mission accomplishment.

*p < .01.
**p < .001.

Table 10

Intercorrelations Between Effectiveness Ratings for the Mechanized Attack

	S2	S3	S4	FS	Cdr	Msn	CG
S1	.59	.59	.63	.26	.65	.21	.50
S2		.87**	.68*	.24	.39	.22	.77**
S3			.58	.32	.42	.57	.90**
S4				.39	.33	.10	.58
FS[a]					.02	.35	.40
Cdr[a]						.14	.46
Msn[a]							.66

[a]FS = utilization of fire support asset.
Cdr = battalion commander.
Msn = mission accomplishment.

*p < .01.
**p < .001.

Table 11

Intercorrelations Between Effectiveness Ratings for the Defense

	S2	S3	S4	FS	Cdr	Msn	CG
S1	-.51	-.67	-.08	.64	.40	-.27	-.46
S2		.64	-.24	-.27	-.42	.27	.19
S3			-.06	-.18	.10	.47	.71*
S4				.53	-.04	-.15	.07
FS[a]					.65	.12	.07
Cdr[a]						.63	.76
Msn[a]							.79*

[a]FS = utilization of fire support asset.
Cdr = battalion commander.
Msn = mission accomplishment.

*p < .01.

Table 12

Intercorrelations Between Effectiveness Ratings for the Nonmechanized Attack

	S2	S3	S4	FS	Cdr	Msn	CG
S1	-.36	-.14	.09	.50	-.18	-.17	.00
S2		.38	-.18	-.13	.22	.63	.17
S3			-.08	.08	.32	.14	.73*
S4				.08	.54	.65	.15
FS[a]					.51	-.04	.18
Cdr[a]						-.15	.42
Msn[a]							.52

[a]FS = utilization of fire support asset.
Cdr = battalion commander.
Msn = mission accomplishment.

*p < .01.

were consistently high in the nonmechanized missions. As was noted in the Method section of this report, when the range of the variables is restricted, the correlation between them is reduced.

Table 13

Number of Administration and Logistics Items Significantly Correlated ($p < .01$) With Effectiveness Ratings

Effectiveness rating	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
S1	14	2	0	0
S4	16	9	12	4
CG[a]	5	3	0	0

Note. The total number of items was 26 in the covering-force operation (CFO) and defense, 28 in the attack.

[a]CG = command group.

Inspection of the data in Tables C-1a through C-1d of Appendix C shows that most of the admin/log subtasks or their elements were significantly correlated with overall effectiveness ratings in all four missions. The subtasks rated by the S1/S4 controller were 3-J (provide supplies) and 3-K (maintain equipment), performed in preparation for the battle; and 9-A (arm and fuel the systems), 9-B (fix the systems), 9-C (support the troops), and 9-D (integrate CSS into scheme of maneuver), performed during the battle. In only a few cases one of these subtasks or its elements was not correlated with a measure of effectiveness. Subtask 3-K was not correlated with effectiveness in the first mission (covering force or defense), when there was no maintenance to perform. Subtasks 9-C and 9-D were not correlated with effectiveness in the mechanized attack, when they were performed consistently well, with little variation. With the preceding exceptions, some elements of every admin/log subtask were significantly correlated with S1, S4, or command group effectiveness in all four missions.

Intelligence and Operations. About 20% of the items in intelligence and operations (intel/ops) were significantly correlated with the effectiveness rating for the command group as a whole (see Table 14). Somewhat fewer items were correlated with the S2 and S3 ratings. There were more significant correlations in the two mechanized missions, because there was a wider range of variation in performance, as noted above.

Table 14

Number of Intelligence and Operations Items Significantly Correlated ($p < .01$) With Effectiveness Ratings

Effectiveness rating	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
S2	9	9	8	2
S3	3	18	8	8
CG[a]	21	17	11	19

Note. The total number of items was 93 in the covering-force operation (CFO), 89 in the mechanized attack, 95 in the defense, and 88 in the nonmechanized attack.

[a]CG = command group.

Most of the intel/ops items were related to ARTEP subtasks and elements thereof. The following subtasks or their elements were consistently correlated with effectiveness ratings in three or in all of the four different missions:

1-B, 2-A. Identify critical combat information and intelligence.
2-B. Gather critical combat information and intelligence.
2-C. Analyze opposing force.
2-D. Disseminate critical combat information and intelligence.
3-C. Organize for combat.
3-G. Communicate/coordinate plans and orders.

(The preceding subtasks were performed in preparation for the battle; the following were performed during the battle.)

5-B. Gather critical combat information and intelligence.

6-B. Coordinate/communicate changes.

8-A. Determine critical place and time.

8-B/C. Concentrate/shift combat power. (8-B, in the attack/8-C, in the defense or retrograde.)

10-A. Defeat or suppress the enemy's electromagnetic intelligence effort.

11-A. Troop lead during battle.

Another item, not explicitly part of any subtask, that was significantly correlated with effectiveness ratings in all four missions, was the question: "How well did the command group apply the time-distance relationship while maneuvering task force elements?"

Subtasks 1-B and 2-A, which are separate items in the ARTEP, could not be evaluated separately by the controllers.

Fire Support. One-third of the items rated by the fire support controller were significantly correlated with his rating of overall fire support effectiveness (see Table 15). However, none of the items was correlated with the rating of command group effectiveness, which is consistent with the low correlation between FS and CG ratings mentioned earlier. The results in Appendix C (Tables C-3a through C-3d) show that all four subtasks rated by the fire support controller were significantly correlated with his rating of fire support effectiveness in three of the four missions. In the nonmechanized attack, when the subtasks were performed consistently well, Subtask 1-L was the only one significantly correlated with fire support effectiveness.

Table 15

Number of Fire Support Items Significantly Correlated ($p < .01$) With Effectiveness Ratings

Effectiveness rating	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
FS[a]	5	6	6	1
CG[a]	0	0	0	0

Note. The total number of items was 14 in the covering-force operation (CFO) and defense, 13 in the attack.

[a]FS = utilization of fire support assets.
CG = command group.

The four subtasks rated by the fire support controller were these:

1-I. Plan use of organic/attached and nonorganic fires.
1-J. Determine priority of fires.
1-L. Conduct initial fire support coordination.
7-A. Modify fire support plan.

Monitor. Few of the items rated by the monitor were correlated with any measure of overall effectiveness (see Table 16), probably because each command group was observed by a different monitor.

Table 16

Number of Items Rated by the Monitor Significantly Correlated ($p < .01$) With Effectiveness Ratings

Effectiveness rating	Mechanized		Nonmechanized	
	CFO	Attack	Defense	Attack
Msn[a]	0	0	3	0
Cdr[a]	2	0	3	1
CG[a]	0	0	3	0

Note. The total number of items in each mission was 47.

[a]Msn = mission accomplishment.
Cdr = battalion commander
CG = command group.

Summary. Figure 4 presents the percentage of items on each observation form that were significantly correlated with one or more measures of effectiveness. In the two mechanized missions and in the defense, many of the S1/S4 items (39% to 65%) and the fire support items (43% to 46%) were correlated with effectiveness. Few of them (14% and 8%) were related to effectiveness in the nonmechanized attack, when they were generally performed well. About one-fourth of the S2/S3 items (22% to 29%) were strongly related to effectiveness in all four missions. Few of the monitor's ratings (0% to 13%) were correlated with effectiveness in any mission.

Comparison with Figure 3 shows that many more items were correlated with effectiveness than were deficient. This was especially true in the defense, where a substantial percentage of the items were significantly related to effectiveness, but few of them were deficient.

Critical Performances

In terms of the criteria employed in this investigation, the most important command group performances were those that were both deficient and significantly correlated with overall effectiveness. Twenty-four of the performances evaluated in the areas of administration and logistics,

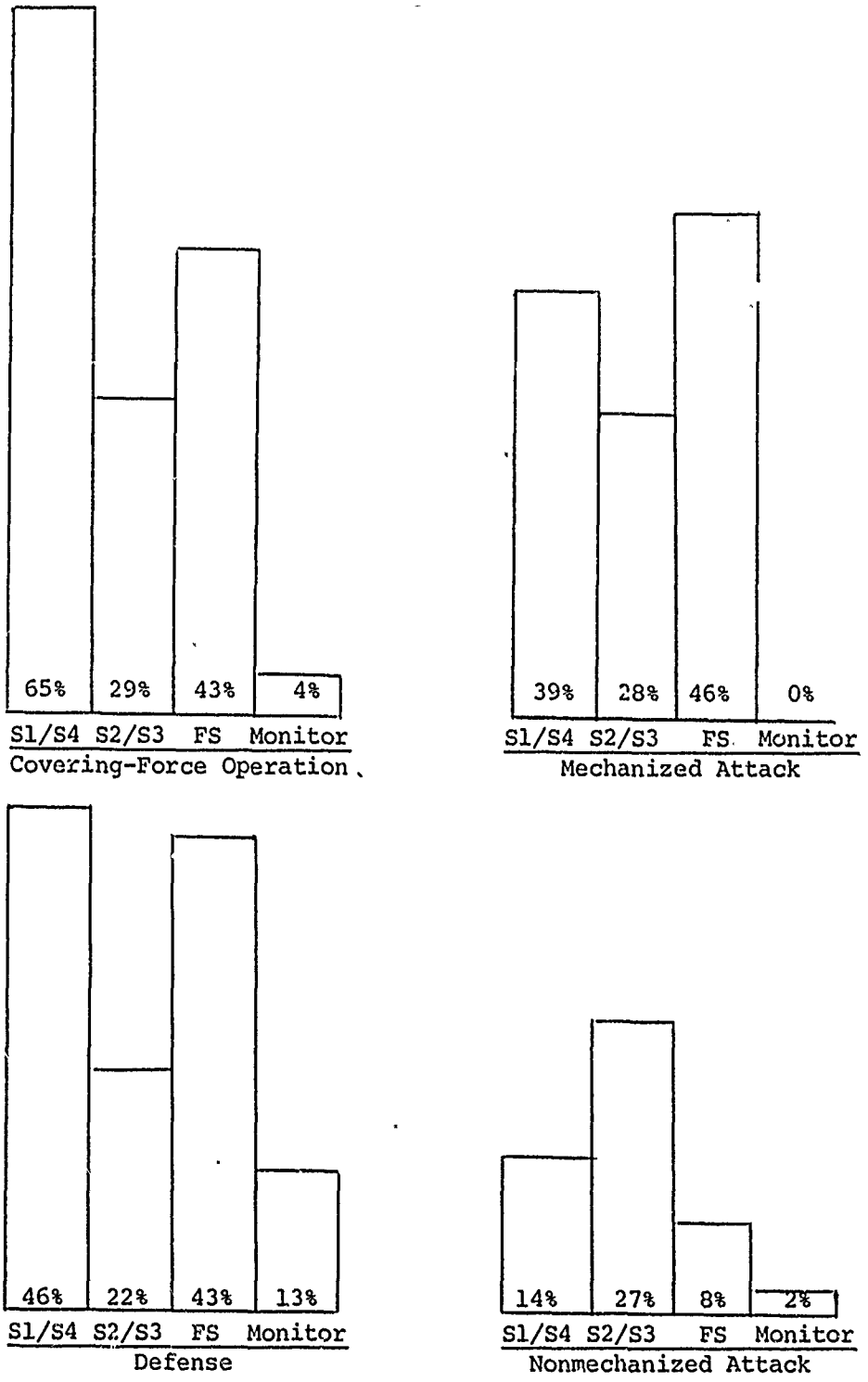


Figure 4. Percentage of items significantly correlated ($p < .01$) with effectiveness for each rater and type of mission.

intelligence and operations, and fire support were identified as critical in at least one mission. These performances and the missions in which they were critical are listed in Tables 17 through 19.

Administration and Logistics. Four items evaluated by the S1/S4 controller were both deficient and correlated with effectiveness. Three of them were critical in the covering-force operation and one in the defense, as shown in Table 17. They are labeled in the table as they were on the controller's observation form. The first three items were elements of Subtask 9-A, arm and fuel the systems. The fourth item was Subtask 9-D, integrate CSS into the scheme of maneuver.

Table 17

Critical Performances in Administration and Logistics

Observation form item	Mission
6. In providing supplies and equipment to arm and fuel the system during the battle: (9-A)	
d. Did the S4 coordinate with the S2 so he knew the enemy's capabilities?	CFO[a]
e. Did the S4 keep his higher appropriately informed of his activities?	CFO
g. Did the S4 effectively utilize direct support assets?	Defense
9. c. How effectively was CSS[a] integrated into the scheme of maneuver? (9-D)	CFO

[a]CFO = covering-force operation.
CSS = combat service support.

Intelligence and Operations. Table 18 lists the 17 items that were identified as critical in this area. They are numbered consecutively in each category. (They were renumbered in the table because they did not have the same numbers on the observation forms for each mission.) Five of the items corresponded to ARTEP subtasks. These were Items A-2, A-4, A-7, D-1, and I-3 which referred to the following subtasks:

1-B, 2-A. Identify critical combat information and intelligence.
2-B. Gather critical combat information and intelligence.

Table 18

Critical Performances in Intelligence and Operations

Observation form item	Mission
A. Intelligence preparation of the battlefield.	
1. Was the enemy's scheme of maneuver and fire support identified?	CFO[a]
2. Overall, how well did the command group identify critical combat information and intelligence? (1-B, 2-A)	CFO
3. Was the task force (TF) intelligence collection plan properly prepared, and did it reflect analysis by the battalion S2 of tasking responsibilities?	CFO, Nonmech atk
4. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (2-B)	CFO, Mech atk
5. Was relevant information (e.g., minefields) from higher headquarters and adjacent units disseminated to company commanders?	Mech atk
6. Were company commanders given an estimate of specifically what they would be facing?	CFO
7. Overall, did the command group disseminate combat information and intelligence that was event-oriented and usable to the recipient? (2-D)	CFO
D. Communicate/coordinate plans and orders.	
1. Overall, were the orders appropriate, clear, concise, and did they contain essential information; were they issued so as to allow TF elements maximum time to go through troop leading procedures; and were they coordinated with proper agencies? (3-G)	CFO, Mech ark

[a]CFO = covering-force operation.

Table 18 (Continued)

Observation form item	Mission
F. Troop lead during the battle.	
1. Were all attached combat units adequately controlled/monitored during the conduct of the exercise? (11-A)	CFO
G. Coordinate/communicate changes.	
1. Did the command group sometimes assume all commanders were monitoring radios for changes? (6-B)	Mech atk
H. Concentrate/shift combat power.	
1. Were tactical decisions made consistent with the time-distance relationship? (8-C)	CFO
I. Enemy EW considerations.	
1. Was there too much communication?	Mech atk
2. Did security violations occur during radio traffic?	CFO, Mech atk
3. Overall, how well did the command group adhere to communications and electronic security measures? (10-A)	CFO, Mech atk
4. Did the command group direct a switch to spare frequency as a last resort, using proper authentication techniques? (12-A)	CFO
J. Other.	
1. Was there sufficient intrastaff coordination between 2/3 and 1/4?	Mech atk
2. How well did the command group apply the time-distance relationship while maneuvering task force elements?	CFO

2-D. Disseminate critical combat information and intelligence.
3-G. Communicate/coordinate plans and orders.
10-A. Defeat or suppress opposing force's electromagnetic intelligence effort.

The subtasks to which the above items referred are indicated in parentheses after the items in the table. Six other items: A-1, A-3, A-5, A-6, I-1, and I-2, were elements of these subtasks. Four more items: F-1, G-1, H-1, and I-4 were elements of the following subtasks:

11-A. Troop lead during battle
6-B. Coordinate/communicate changes.
8-C. Concentrate/shift combat power in the defense or retrograde.
12-A. React to opposing force electronic warfare.

Finally, Items J-1 and J-2 were not classified as part of any specific subtask. Four of the items in Table 18 were critical in both the covering-force and the mechanized attack, one in the covering-force and nonmechanized attack, eight in the covering-force attack alone, and four only in the mechanized attack. None were critical in the defense.

Fire Support. The three items in Table 19 are labeled as they were on the fire support observation forms. Item 1a was part of Subtask 1-I (plan use of organic/attached and nonorganic fires). Item 4b was part of Subtask 7-A (modify fire support plan), and Item 4c referred to the entire Subtask 7-A. All three performances were critical in the covering force.

Table 19

Critical Performances in Fire Support

Observation form item	Mission
1. Plan use of organic/attached and nonorganic fires. (1-I)	
a. Did fire plan effectively utilize heavy mortars?	CFO[a]
4. Modify fire support plan. (7-A)	
b. Were requests for immediate fire support received and assigned to appropriate fire support agencies?	CFO
c. Overall, how well did the command group perform relative to the standard?	CFO

[a]CFO = covering-force operation.

Monitor. Two items rated by the monitor met the joint criteria of deficiency and correlation with effectiveness: Subtask 8-A (determine critical place and time); and Subtask 8-C (concentrate/shift combat power in the defense or retrograde) were both identified as critical in the covering-force operation.

Summary. It is apparent in Figure 5 that the majority of critical performances were identified in the covering-force operation, where 12% to 21% of the S1/S4, S2/S3, and fire support items were both deficient and significantly correlated with effectiveness. A secondary concentration of critical performances (10%) occurred in the S2/S3 area in the mechanized attack. Very few items were critical in the defense or the nonmechanized attack.

Rater Reliability

Comparing the performance ratings from several different observers of the same command group suggested three related questions:

1. How reliable were the ratings of a single observer?
2. How reliable were the mean ratings from several observers?
3. How significant were the differences among raters?

Since the intelligence and operations items were scored by four or five raters at every exercise, it was possible to measure the amount of consistency or disagreement among different raters. (Rater reliability measures the consistency within one or more raters; conversely, analysis of variance tests the significance of differences among raters.)

Reliability is defined as the ratio of true score variance to total score variance, where "true score" means that part of the score that is the same at each rescoring. Two measures of rater reliability (Guilford, 1954) are the reliability of ratings from a single rater, r_{11}, and the reliability of mean ratings from k raters, r_{kk}:

$$r_{11} = \frac{Vi - Ve}{Vi + (k-1)\,Ve} \text{ and } r_{kk} = \frac{Vi - Ve}{Vi},$$

where Vi = variance for items,
Ve = variance for error, and
k = number of raters.

Table 20 lists the coefficients of rater reliability for eight randomly selected missions in the order in which the missions occurred. Each coefficient was calculated from the intelligence and operations items rated on a 5-point scale by four or five observers. The reliability of ratings from a single rater varied from .07 to .38 with a mean of .22. The reliability of mean ratings from several observers varied from .29 to .71 with a mean of .55. Thus, increasing the number of raters from one to four or five more than doubled the rater reliability.

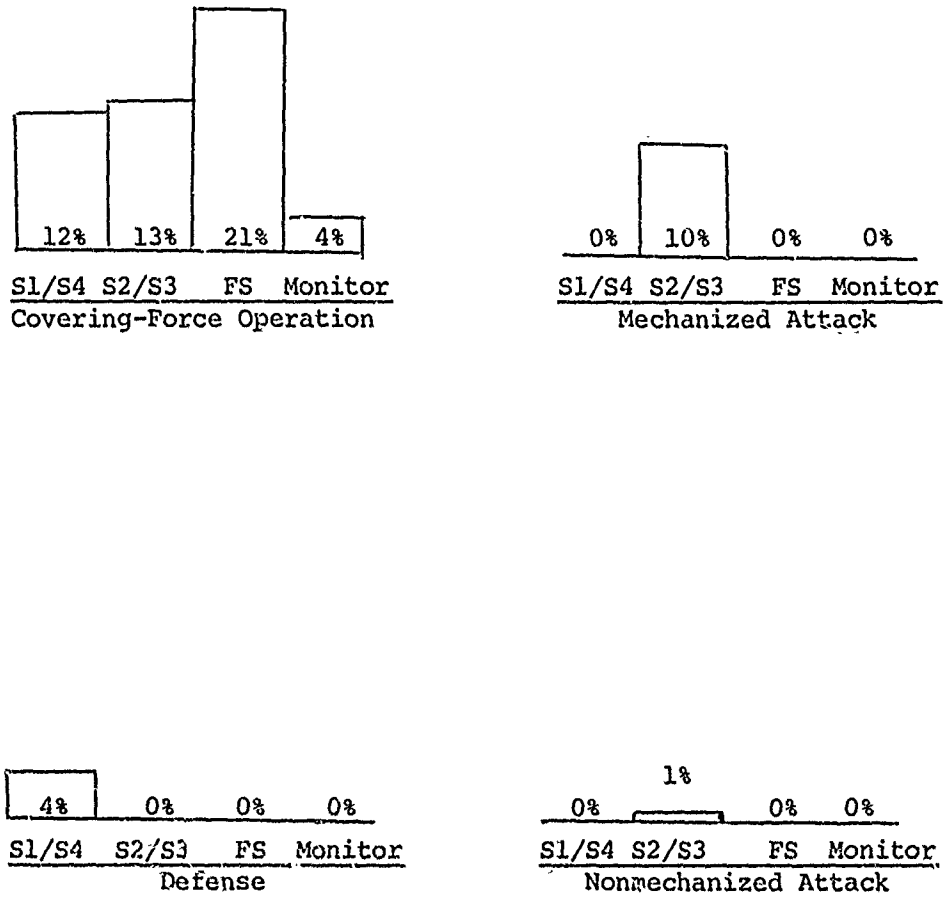


Figure 5. Percentage of items identified as critical by each rater for each type .f mission.

Table 20

Rater Reliability for Eight Selected Missions

Number raters, k	Coefficient of reliability: Single rater, r_{11}	Coefficient of reliability: Mean of k raters, r_{kk}
4	.24	.56
5	.21	.57
4	.21	.52
5	.26	.64
4	.38	.71
5	.24	.61
5	.18	.53
5	.07	.29

The variance analyses on which the reliability estimates were based are summarized in Appendix E. These analyses show that in every case the differences among raters were statistically significant beyond the .001 level. In a typical case, with $r_{11} = .21$ and $r_{55} = .57$, the mean ratings from five different observers, averaged over all the 5-point intelligence and operations items, were 2.6, 3.5, 3.8, 3.9, and 4.4. Significant differences among the means of different raters for the same command group is evidence of rater bias, i.e., the tendency of an individual to give high or low ratings. One implication of this result is that the same rater or, preferably, raters should be employed when comparing the performances of different command groups or of the same command group at different times.

DISCUSSION

Critical Subtasks

This investigation brings to 50 the total number of battalion command groups whose performance in CATTS exercises has been analyzed; 23 groups were observed in the present study and 27 in the previous one (Barber & Kaplan, 1979). Both investigations used essentially the same criteria of low performance rating and high correlation with effectiveness to identify critical performances, although there were some differences in detail. One difference was that in the present investigation a subtask was considered critical when any one of its elements was critical, whereas in the previous investigation subtask elements were not rated. Another difference was in the cutoff point for identifying low-rated performances. In this investigation, a performance was classified

as deficient when its mean rating was at or below the midpoint of the rating scale. In the previous study, a performance was considered deficient when its mean rating was one standard deviation below the mean of all the subtasks rated by the observer who evaluated it.

A relative criterion, rather than the midpoint of the scale, was used in the previous investigation because very few subtasks were rated below the middle of the 3-point scale used in that study. The 3 points were defined as

1. Unsatisfactory, major departure from ARTEP standard,
2. Minor deviation from standard, and
3. Satisfies the standard.

The lowest rating was rarely given. By contrast, the 5-point scale used in this investigation increased the range of scores given for subtask performance, so that for every rater there were several subtasks whose mean ratings were below the midpoint of the scale.

In spite of some differences in procedure between the two investigations, there was considerable agreement between them with respect to the subtasks that were identified as critical. Table 21 summarizes all the subtasks that were critical in either study--a total of 20 different subtasks. It can be seen that 14 subtasks were identified in the previous investigation and 15 in the present one. Nine subtasks were critical in both studies: 1-B, 1-I, 2-A, 2-B, 3-G, 8-A, 8-C, 10-A, 12-A.

Furthermore, all the subtasks that were critical in only one study met one criterion of criticality in the other. Thus, five subtasks (2-C, 5-B, 5-C, 5-D, 8-B) were critical in the earlier investigation but not in this one. Four of them (2-C, 5-B, 5-C, 5-D) were deficient in the present investigation; however, they were not correlated with effectiveness. The fifth (8-B) was correlated with effectiveness but was not deficient. Conversely, six subtasks (2-D, 6-B, 7-A, 9-A, 9-D, 11-A) that were critical in this study were not critical in the previous one. Subtask 2-D was deficient in the previous study, but it was not then correlated with effectiveness. The other five subtasks (6-B, 7-A, 9-A, 9-D, 11-A) were correlated with effectiveness but were not deficient. Overall, the two investigations of battalion command group performance were in general agreement concerning the identification of critical ARTEP subtasks.

The four missions, however, differed greatly with respect to subtask criticality. All but one (6-B) of the 15 subtasks that were critical in this investigation were critical in the covering-force operation. Five subtasks (2-B, 2-D, 3-G, 6-B, 10-A) were critical in the mechanized attack. Only one (9-A) was critical in the defense and one (2-B) in the nonmechanized attack. The distribution of critical subtasks paralleled the distribution of performance deficiencies, i.e., the greatest number of deficiencies occurred in the covering-force mission, followed by the mechanized attack, defense, and nonmechanized attack.

Table 21

Subtasks Identified as Critical for Battalion Command Group Training

Task/subtask		Previous study	Present study
Task 1.	Develop plan based on mission.		
1-B.	Identify critical combat information and intelligence.	X	X
1-I.	Plan fires.	X	X
Task 2.	Initiate intelligence preparation of the battlefield.		
2-A.	Identify critical combat information and intelligence.	X	X
2-B.	Gather critical combat information and intelligence.	X	X
2-C.	Analyze opposing force.	X	
2-D.	Disseminate critical combat information and intelligence.		X
Task 3.	Prepare and organize the battlefield.		
3-G.	Communicate/coordinate plans and orders.	X	X
Task 5.	See the battlefield during the battle.		
5-B.	Gather critical combat information and intelligence.	X	
5-C.	Analyze opposing force.	X	
5-D.	Disseminate critical combat information and and intelligence.	X	
Task 6.	Control and coordinate combat operations.		
6-B.	Coordinate/communicate changes.		X
Task 7.	Employ fires and other combat support assets.		
7-A.	Modify fire support plan.		X
Task 8.	Concentrate/shift combat power.		
8-A.	Determine critical place and time	X	X
8-B.	Concentrate/shift combat power in the attack.	X	
8-C.	Concentrate/shift combat power in the defense or retrograde.	X	X
Task 9.	Manage combat service support assets.		
9-A.	Arm and fuel the systems.		X
9-D.	Integrate CSS into scheme of maneuver.		X
Task 10.	Secure and protect the TF.		
10-A.	Defeat or suppress opposing force's electromagnetic intelligence effort.	X	X
Task 11.	Troop lead during battle.		
11-A.	Supervise compliance with TF order.		X
Task 12.	React to situations requiring special actions.		
12-A.	React to opposing force electronic warfare.	X	X

Performance differences between the first and second missions may have been caused by improvement with practice or by differences in difficulty. The contributions of practice and difficulty were confounded, because the second mission was always an attack. The results do indicate, however, that the mechanized missions were more difficult than the nonmechanized ones. In the previous investigation, there were too few nonmechanized units to permit a similar comparison of mission performance.

Rater Reliability

The utility of the command group ARTEP as a means of diagnosing training deficiencies and evaluating command group effectiveness is limited by its reliability as a measuring instrument. Even under the ideal conditions of this investigation (i.e., with experienced controller-evaluators, a realistic, automated battle simulation, and a standardized scenario), rater reliability was not high. One potential source of variability among raters was that each rater experienced a different interaction with the command group, e.g., each company commander led a different team in the simulated battle. Another factor may have been variation in the personal criteria involved in subjective judgment. Low reliability can be tolerated in research, when ratings from many units can be averaged so that rating errors tend to cancel out. However, low reliability is a problem when performance ratings are used to diagnose and evaluate individual command groups.

Two steps can be taken in the present time frame to enhance the reliability of command group performance ratings: One is to average the ratings from several different observers; the other is to use the same raters when comparing different command groups or when evaluating the performance of a given group at different times. Over the longer term, however, the improvement of rater reliability will require continued research to develop more objective measures of command group performance and to identify the factors that cause differences in ratings of the same command group by different observers.

SUMMARY AND CONCLUSIONS

Fifteen subtasks of the Command Group/Staff Module of ARTEP 71-2 were identified as critical by virtue of being both low rated and highly correlated with effectiveness. These subtasks can be summarized briefly within five functional areas:

1. Fire support: Develop (1-I) and modify (7-A) the fire support plan.

2. Intelligence preparation of the battlefield: Identify (1-B, 2-A), gather (2-B), and disseminate (2-D) critical combat information and intelligence.

3. Operations: Communicate/coordinate plans and orders (3-G) and changes (6-B), and supervise compliance with the task force order (11-A). Determine the critical place and time (8-A) and concentrate/shift combat power (8-C).

4. Logistics: Arm and fuel the systems (9-A) and integrate combat service support into the scheme of maneuver (9-D).

5. Electronic warfare: Combat enemy electromagnetic intelligence (10-A) and electronic warfare (12-A).

These critical performances should be given particular attention in the development and evaluation of command group training programs and simulations.

The four missions observed in this investigation were markedly different with respect to subtask criticality. All but one (6-B) of the subtasks listed above were critical in the covering-force operation, five (2-B, 2-D, 3-G, 6-B, 10-A) were critical in the mechanized attack, one (9-A) in the defense, and one (2-B) in the nonmechanized attack. The effects of practice and difficulty were confounded in comparing the attack missions to the covering-force or defense, because the attack was always the second mission. It can be inferred, however, that the covering-force mission was more difficult for the mechanized groups than the defense was for the nonmechanized groups, since both those missions were performed first--by mechanized and nonmechanized groups, respectively.

Rater reliability was low. The coefficient of reliability for subtask performance scores from a single rater was only .22. It increased to .55 when the scores from four or five raters were averaged.

Individual raters differed in their judgment of subtask performance. The differences among ratings of the same command group by different observers were significant beyond the .001 level.

The effects of mission type, rater reliability, and individual differences among raters have implications for the measurement of command group performance. These effects should be controlled when diagnosing training requirements, comparing command groups, or evaluating training systems. Specifically, the same type of mission and the same raters (several raters) should be used when comparing the performance of different command groups or of the same command group at different times. In addition, the low rater reliability and significant differences among raters indicate the desirability of further research (a) to develop more objective measures of command group performance and (b) to identify those subtasks wherein the difference perspectives of the raters should produce valid differences in performance ratings.

REFERENCES

Army Training and Evaluation Program for Mechanized Infantry/Tank Task Force, No. 71-2. Washington, D.C.: Headquarters, Department of the Army, 17 June 1977.

Barber, H. F., & Kaplan, I. T. Battalion Command Group Performance in Simulated Combat. ARI Technical Paper 353, March 1979.

Battle Simulations and the ARTEP. Fort Leavenworth, Kans.: Combined Arms Training Development Activity, 18-461, November 1977.

Eckstrand, G. A. Current Status of the Technology of Training. AMRL Document, Technical Report 64-86, September 1964.

Guilford, J. P. Psychometric Methods (2nd ed.). New York: McGraw Hill, 1954.

Interservice Procedures for Instructional Systems Development. TRADOC Pamphlet 350-35. Fort Monroe, Va.: U.S. Army Training and Doctrine Command, 1975.

Kirk, R. E. Experimental Design: Procedures for the Behavioral Sciences. Belmont, Calif.: Brooks Cole, 1968.

Scandura, J. M. Structural Approach to Instructional Problems. American Psychologist, 1977, 32, 33-54.

Welkowitz, J., Ewen, R. B., & Cohen, J. Introductory Statistics for the Behavioral Sciences (2nd ed.). New York: Academic Press, 1976.

APPENDIX A

EXERCISE SCHEDULES

Since these were free play exercises, the times listed below are approximate and varied from one exercise to another.

MECHANIZED--THREE-DAY EXERCISE

The Active Army mechanized infantry, armor, and cavalry battalion command groups had the following schedule of activities:

Day 1

0800 Players arrive, receive administrative briefing.
1000 Brigade staff briefing, exercise begins.
1100 Players prepare operations order.
1400 Unit starts moving toward canal.
1530 Unit arrives at canal.
1700 Players released.

Day 2

0730 Players arrive.
0830 Enemy artillery preparation for canal crossing.
1000 Enemy begins to cross canal with BMPs.
1100 Enemy units establish bridgehead across the canal.
1130 Enemy breaks out of bridgehead and attacks toward Mitla Pass.
1330 Unit begins passage of lines.
1430 Unit moves into reserve positions.
1500 Players prepare contingency plan.
1600 Players brief company commanders.
1630 Brigade commander gives guidance (warning order).
1700 Players released.

Day 3

0730 Players arrive, receive brigade frag order.
0830 Simulation begins.
1030 Line of departure time.
1200 Battalion on objective.
1200 Lunch.
1300 Players fill out questionnaires.
1430 Group critique.
1530 Individual critiques.

1600 Demonstration of CATTS control system.
1700 Termination of course.

MECHANIZED--TWO-DAY EXERCISE

The National Guard mechanized infantry battalion command groups had the following schedule of activities:

Day 1

0700 Players arrive, receive administrative briefing.
0730 Battalion receives reconnaissance report.
0745 Brigade updates battalion on present situation and mission.
0830 Battalion briefs order to company commanders.
0930 Battalion starts moving toward canal.
1030 Enemy moves to canal.
1100 Battalion on canal.
1130 Enemy prepares to cross canal.
1300 Enemy crosses with BMPs.
1630 Battalion breaks contact. Players released.

Day 2

0700 Players arrive, receive brigade frag order.
0930 Line of departure time.
1100 Battalion on objective.
1130 Critique.
1230 Demonstration of CATTS control system.
1300 Termination of course.

NONMECHANIZED--THREE-DAY EXERCISE

The Active Army nonmechanized infantry battalion command groups had the following schedule of activities:

Day 1

0800 Players arrive, receive administrative briefing.
1000 Brigade staff briefing, exercise begins.
1130 Players prepare operations order.
1600 Unit starts moving toward battle positions.
1700 Players released.

Day 2

0730 Players arrive. Company commanders brief battalion on positions.
0920 Enemy breaks out of bridgehead.
0925 Covering force starts withdrawal.
1030 Enemy attacks battle position.
1500 Unit stops enemy attack and consolidates position.
1615 Brigade commander gives guidance (warning order).
1700 Players released.

Day 3

0730 Players arrive, receive brigade frag order.
0800 Simulation begins.
0900 Battalion issues operations order to companies.
1000 Line of departure time.
1200 Battalion on objective.
1200 Lunch.
1300 Players fill out questionnaires.
1430 Group critique.
1530 Individual critiques.
1600 Demonstration of CATTS control system.
1700 Termination of course.

APPENDIX B

CATTS CRITICAL PERFORMANCES

Mission: Covering Force/Defense Position: Fire Support Element Date:_____

Instructions: In your position you are able to observe various aspects of battalion command group performance. The following form is based on the Battalion Command Group ARTEP Critical Subtask list and frequently observed training weaknesses observed during previous CATTS exercises. For each relevant subtask, a standard is presented along with related key events. For each subtask and key event, please circle the response that corresponds to your perception of the command group's performance. If additional key events influenced your evaluation or specific clarification is required, please record it under Comments. Please indicate any additions, deletions, or changes that would make the form more useful.

Rating Scale: 1 - Completely overlooked/forgotten
2 - Major deficiencies
3 - Minor deficiencies
4 - Satisfactory
5 - Excellent

Subtask	Standard and Key Events	Rating	Comments
1. Plan use of organic/attached and non-organic fires (1I).	Plan, continuously up-dated, provides for organic/attached/non-organic supporting preplanned fires, fires against target of opportunity suppression, surprise and deception, air defense coverage while allowing Task Force to maneuver freely.		
	a. Did fire plan effectively utilize organic heavy mortars?	No Yes	
	b. Did fire plan effectively utilize supporting arty?	No Yes	
	c. Was appropriate target list developed?	No Yes	

Subtask	Standard and Key Events	Rating	Comments
	d. Was adequate coordination with FOs made?	No Yes	
	e. Overall, how well did the command group perform relative to the standard?	1 2 3 4 5	
2. Determine priority of fires (1J).	Priority of fires, to include air defense fires, is given to Task Force elements to support the scheme of maneuver. Priorities for counterfires and suppressive fires are established. If appropriate, dedicated battery is specified.		
	a. Were priority of fires given to appropriate TF element(s) to support scheme of maneuver?	No Yes	
	b. Were suppression of fires considered?	No Yes	
	c. Overall, how well did the command group perform relative to the standard?	1 2 3 4 5	
3. Conduct initial fire support coordination (1L)	Determine fire support/target acquisition assets available; determine fire support coordination measures.		
	a. Did the command group effectively determine fire support/target acquisition assets available?	No Yes	
	b. Did the command group determine fire support coordination measures?	No Yes	
	c. Overall, how well did the command group perform relative to the standard?	1 2 3 4 5	

The following subtasks pertain to fighting the battle:

Subtask	Standard and Key Events	Rating	Comments
4. Modify fire support plan (7A)	Priority of fires which supports the new scheme of maneuver is immediately communicated to supporting and supported units. Requests for immediate fire support are received and assigned to the appropriate fire support agencies. Missions are assigned which support anticipated developments.		
	a. During the battle were priority of fires supporting new scheme of maneuver immediately communicated to supporting and supported units?	No Yes	
	b. Were requests for immediate fire support received and assigned to appropriate fire support agencies?	No Yes	
	c. Overall, how well did the command group perform relative to the standard?	1 2 3 4 5	

5. Overall, how well did this command group utilize its fire support assets in comparison with previous groups in Covering Force operations?

Check one:

____1. One of the worst
____2. Worse than average
____3. Average
____4. Better than average
____5. One of the best

APPENDIX C

Summary of Results

The results are summarized in the following tables:

Each table contains the following information:

a. A statement of each item.

b. The number of command groups from which data were obtained.

c. The percentage of yes responses to yes/no items.

d. The mean score of items rated on a five-point scale.

e. The standard deviation for items rated on a five-point scale.

f. The coefficients of correlation between the rating for each item and measures of overall effectiveness.

TABLE C-1a
S1/S4 Ratings
Covering Force

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
1. In providing supplies to accomplish the mission: a. Did the S4 coordinate with supporting supply elements?	13	69			.68*	81**	.52
b. Did the S4 know the battalion mission prior to LD time?	13	85			.44	.45	.09
c. Did the S4 know the Bn OPORD prior to LD time?	13	69			.79**	.81**	.56
d. Did the S1/4 have the operational overlay in the combat trains prior to its effective time?	13	77			.75*	.6[illegible]*	.52
e. How effectively did the S4 provide supplies to accomplish the mission? (3J)	13		3.15	1.46	.78**	.87**	.68*
2. In preparing for the battle: a. Did the S1 know the battalion's mission prior to LD time?	13	92			.39	.21	.00
b. Did the S1 know the Bn OPORD prior to LD time?	13	92			.39	.21	.00

*p <.01
**p <.001

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
3. Did the S4 determine the status of equipment before the battle?	12	100			NV	NV	NV
6. In providing supplies and equipment to arm and fuel the system during the battle:							
a. Were requests for supplies/ equipment handled expeditiously in accord with the SOP?	13	54			.53	.68*	.50
b. Was delivery to TF elements made as far forward as prudent?	13	85			.58	.59	.62
c. Were time-distance movement factors considered in resupplying the units?	13	77			.25	.29	.12
d. Did the S4 corrdinate with the S2 so he knew the enemy's capabilitites?	12	50			.65*	.72*	.58
e. Did the S4 keep his higher appropriately informed of his activities?	11	45			.68*	.76*	.44
f. Did the S4 effectively utilize his organic assets?	13	69			.57	.71*	.60
g. Did the S4 effectively utilize his direct support assets?	13	54			.84**	.78**	.55

*p <.01
**p <.001
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
9. In terms of integrating CSS into the scheme of maneuver:							
a. Were CSS resources kept close enough to support the battle, but far enough from the FEBA so that support was continuous?	13	62			.65*	.69*	.60
b. Were transportation assets used to fit movement of CSS resources to the scheme of maneuver?	13	46			.53	.60	.47
c. How effectively was CSS integrated into the scheme of maneuver? (9D)	13		3.00	1.29	.89**	.91**	.86**
Overall, how well did the S1 perform in comparison with previous S1's?	13		3.00	1.53		.87**	.73*
Overall, how well did the S4 perform in comparison with previous S4's?	13		3.15	1.63	.87**		.66*

*p <.01
**p <.001

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
h. How effectively did the S4 provide ammunition, POL, equipment and other supplies critical to the operability of TF weapons systems? (9A)	13		3.54	1.20	.68*	.85**	.67*
7. How effectively did the S4 direct maintenance and repair of the systems? (9B)	13		3.23	1.30	.75**	.89**	.69*
8. In supporting the troops:							
a. Did the S1 implement health preservation programs?	13	54			.42	.39	.54
b. Did the S1 control and expeditiously move replacements to points where they were needed?	11	64			.70*	.65	.64
c. Did the S1 coordinate with the S2 so he knew the enemy's capabilities?	13	77			.12	-.06	.17
d. Did the S1 keep brigade appropriately informed of his actions?	13	62			.86**	.89**	.49
e. Did the S4 manage troop subsistence adequately?	12	67			.81**	.81**	.60
f. How well did the S1 and S4 support the troops? (9C)	12		3.08	1.44	.91**	.91**	.74*

*p <.01
**p <.001

TABLE C-1b
S1/S4 Ratings
Mechanized Attack

Item	N	% YES	MEAN	SD	Correlation S1	Correlation S4	Correlation CG
1. In providing supplies to accomplish the mission: a. Did the S4 coordinate with supporting supply elements?	12	83			.48	.84**	.70*
b. Did the S4 know the battalion mission prior to LD time?	12	100			NV	NV	NV
c. Did the S4 know the Bn OPORD prior to LD time?	12	100			NV	NV	NV
d. Did the S1/4 have the operational overlay in the combat trains prior to its effective time?	12	92			-.45	-.31	-.11
e. How effectively did the S4 provide supplies to accomplish the mission? (3J)	12		4.08	.79	.64	.91**	.45
2. In preparing for the battle: a. Did the S1 know the battalion's mission prior to LD time?	12	92			.32	.56	.64
b. Did the S1 know the Bn OPORD prior to LD time?	12	92			.32	.56	.64

*p <.01
**p <.001
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
3. In maintaining equipment before the battle:							
a. Did the S4 determine the status of equipment?	12	83			.28	.51	.62
b. Did the S4 direct repair evaluation of non-operational equipment critical to mission accomplishment?	7	71			.59	.87*	.78
c. How well did the S4 maintain equipment before the battle? (3K)	9		3.56	1.59	.58	.98**	.72
6. In providing supplies and equipment to arm and fuel the system during the battle:							
a. Were requests for supplies/equipment handled expeditiously in accord with the SOP?	9	78			.17	.65*	-.03
b. Was delivery to TF elements made as far forward as prudent?	11	63			.59	.53	.80*
c. Were time-distance movement factors considered in resupplying the units?	11	91			.03	.10	.18
d. Did the S4 coordinate with the S2 so he knew the enemy's capabilities?	12	83			-.10	.03	-.11

*p < .01
**p < .001

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
e. Did the S4 keep his higher appropriately informed of his activities?	12	58			.33	.48	.13
f. Did the S4 effectively utilize his organic assets?	12	92			.06	.13	-.40
g. Did the S4 effectively utilize his direct support assets?	11	73			.47	.84**	.40
h. How effectively did the S4 provide ammunition, POL, equipment and other supplies critical to the operability of TF weapons systems? (9A)	12		3.92	.79	.50	.84**	.51
7. How effectively did the S4 direct maintenance and repair of the systems? (9B)	12		3.75	1.06	.55	.94**	.56
8. In supporting the troops:							
a. Did the S1 implement health preservation programs?	10	60			.72*	.37	.71*
b. Did the S1 control and expeditiously move replacements to points where they were needed?	11	73			.43	.65	.65
c. Did the S1 coordinate with the S2 so he knew the enemy's capabilities?	12	92			.32	-.31	.23

*p <.01
**p <.001

Item	N	% N/S	MEAN	SD	Correlation S1	S4	CG
d. Did the S1 keep brigade appropriately informed of his actions?	12	58			.62	.60	.18
e. Did the S4 manage troop subsistence adequately?	12	83			.29	.03	-.52
f. How well did the S1 and S4 support the troops? (9C)	11		3.73	1.10	.83**	.97**	.66
9. In terms of integrating CSS into the scheme of maneuver: a. Were CSS resources kept close enough to support the battle, but far enough from the FEBA so that support was continuous?	12	100			NV	NV	NV
b. Were transportation assets used to fit movement of CSS resources to the scheme of maneuver?	12	100			NV	NV	NV
c. How effectively was CSS integrated into the scheme of maneuver?	12		3.83	1.03	.54	.81**	.26
Overall, how well did the S1 perform in comparison with previous S1's?	12		3.25	1.22		.63	.50
Overall, how well did the S4 perform in comparison with previous S4's?	12		3.58	1.44	.63		.58

**p <.001
NV = No variation

TABLE C-1c
S1/S4 Ratings
Defense

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
1. In providing supplies to accomplish the mission: a. Did the S4 coordinate with supporting supply elements?	9	67			-.16	.94**	.16
b. Did the S4 know the battalion mission prior to LD time?	9	89			.40	.47	-.25
c. Did the S4 know the Bn OPORD prior to LD time?	9	89			.40	.47	-.25
d. Did the S1/4 have the operational overlay in the combat trains prior to its effective time?	9	100			NV	NV	NV
e. How effectively did the S4 provide supplies to accomplish the mission? (3J)	9		3.44	1.51	-.03	.96**	.08
2. In preparing for the battle: a. Did the S1 know the battalion's mission prior to LD time?	9	100			NV	NV	NV
b. Did the S1 know the Bn OPORD prior to LD time?	9	100			NV	NV	NV

**p <.001
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	Correlation S4	Correlation CG
3. Did the S4 determine the status of equipment before the battle?	9	100			NV	NV	NV
6. In providing supplies and equipment to arm and fuel the system during the battle:							
a. Were requests for supplies/equipment handled expeditiously in accord with the SOP?	9	67			-.16	.94**	.16
b. Was delivery to TF elements made as far forward as prudent?	9	67			-.16	.94**	.16
c. Were time-distance movement factors considered in resupplying the units?	9	78			.06	.71	.34
d. Did the S4 coordinate with the S2 so he knew the enemy's capabilities?	8	63			-.26	.93**	.19
e. Did the S4 keep his higher appropriately informed of his activities?	9	33			.16	.54	.14
f. Did the S4 effectively utilize his organic assets?	9	56			.10	.76*	-.17
g. Did the S4 effectively utilize his direct support assets?	9	56			.10	.90**	.18
h. How effectively did the S4 provide ammunition, POL, equipment and other supplies critical to the operability of TF weapons systems? (9A)	9		3.44	1.42	-.20	.91**	.08

*p <.01
**p <.001
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
7. How effectively did the S4 direct maintenance and repaid of the systems? (9B)	9		3.22	1.48	-.02	.84*	-.26
8. In supporting the troops:							
a. Did the S1 implement health preservation programs?	9	100			NV	NV	NV
b. Did the S1 control and expeditiously move replacements to points where they were needed?	9	89			-.32	.47	.70
c. Did the S1 coordinate with the S2 so he knew the enemy's capabilities?	8	100			NV	NV	NV
d. Did the S1 keep brigade appropriately informed of his actions?	9	78			.06	.20	.15
e. Did the S4 manage troop subsistence adequately?	9	78			.06	.71	.34
f. How well did the S1 and S4 support the troops? (9C)	9		3.56	.73	-.25	.86*	.01
9. In terms of integrating CSS into the scheme of maneuver:							
a. Were CSS resources kept close enough to support the battle, but far enough from the FEBA so that support was continuous?	9	78			-.48	.20	-.38

*p <.01
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	Correlation S4	Correlation CG
b. Were transportation assets used to fit movement of CSS resources to the scheme of maneuver?	9	67			-.16	.94**	.16
c. How effectively was CSS integrated into the scheme of maneuver? (9D)	9		3.33	1.50	-.26	.92**	.03
Overall, how well did the S1 perform in comparison with previous S1's?	9		3.56	.53		-.08	-.46
Overall, how well did the S4 perform in comparison with previous S4's?	9		3.11	1.69	-.08		.07

**p $<$.001

TABLE C-1d
S1/S4 Ratings
Non-Mechanized Attack

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
1. In providing supplies to accomplish the mission: a. Did the S4 coordinate with supporting supply elements?	9	89			.44	.38	-.03
b. Did the S4 know the battalion mission prior to LD time?	9	100			NV	NV	NV
c. Did the S4 know the Bn OPORD prior to LD time?	9	100			NV	NV	NV
d. Did the S1/4 have the operational overlay in the combat trains prior to its effective time?	9	100			NV	NV	NV
e. How effectively did the S4 provide uspplies to accomplish the mission. (3J)	9		3.89	.93	.36	.75*	.31
2. In preparing for the battle: a. Did the S1 know the battalion's mission prior to LD time?	9	100			NV	NV	NV
b. Did the S1 know the Bn OPORD prior to LD time?	9	100			NV	NV	NV

*p <.01
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	S4	CG
3. In maintaining equipment before the battle:							
a. Did the S4 determine the status of equipment?	9	100			NV	NV	NV
b. Did the S4 direct repair evaluation of non-operational equipment critical to mission accomplishment?	8	88			-.14	.46	.58
c. How well did the S4 maintain equipment before the battle? (3K)	9		4.33	.50	.25	.76*	.46
6. In providing supplies and equipment to arm and fuel the system during the battle:							
a. Were requests for supplies/ equipment handled expeditiously in accord with the SOP?	8	75			.22	.56	-.22
b. Was delivery to TF elements made as far forward as prudent?	9	100			NV	NV	NV
c. Were time-distance movement factors considered in resupplying the units?	9	89			-.13	.38	-.25
d. Did the S4 coordinate with the S2 so he knew the enemy's capabilities?	9	89			-.13	.38	.58

*p <.01
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	Correlation S4	Correlation CG
e. Did the S4 keep his higher appropriately informed of his activities?	7	57			.47	.51	.57
f. Did the S4 effectively utilize his organic assets?	9	78			-.19	.57	-.24
g. Did the S4 effectively utilize his direct support assets?	9	44			.32	.84*	.07
h. How effectively did the S4 provide ammunition, POL, equipment and other supplies critical to the operability of TF weapons systems? (9A)	9		3.78	.97	-.09	.45	.55
7. How effectively did the S4 direct maintenance and repair of the systems? (9B)	8		4.00	.76	.27	.87*	.32
8. In supporting the troops:							
a. Did the S1 implement health preservation programs?	9	100			NV	NV	NV
b. Did the S1 control and expeditiously move replacements to points where they were needed?	9	100			NV	NV	NV
c. Did the S1 coordinate with the S2 so he knew the enemy's capabilities?	9	100			NV	NV	NV

*p <.01
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S1	Correlation S4	Correlation CG
d. Did the S1 keep brigade appropriately informed of his actions?	8	100			NV	NV	NV
e. Did the S4 manage troop subsistence adequately?	9	100			NV	NV	NV
f. How well did the S1 and S4 support the troops? (9C)	8		3.75	.89	.19	.16	.76
9. In terms of integrating CSS into the scheme of maneuver:							
a. Were CSS resources kept close enough to support the battle, but far enough from the FEBA so that support was continuous?	9	89			-.13	.38	-.06
b. Were transportation assets used to fit movement of CSS resources to the scheme of maneuver?	9	78			-.19	.14	-.49
c. How effectively was the CSS integrated into the scheme of maneuver? (9D)	9		3.56	1.33	-.13	.52	.21
Overall, how well did the S1 perform in comparison with previous S1's?	9		3.78	.67		.09	.00
Overall, how well did the S4 perform in comparison with previous S4's?	9		3.33	1.32	.09		.15

NV = No variation

TABLE C-2a
S2/S3 and CC Ratings
Covering Force

ITEM	N	% YES	MEAN	SD	CORRELATION S2	S3	CG
A. Intelligence preparation of the battlefield.							
1. Were avenues of approach into defended areas identified?	13	76			.42	.33	.40
2. Was the composition and size of attacking force identified?	13	63			.47	.41	.56
3. Was the enemy's scheme of maneuver and fire support identified?	13	41			.70*	.35	.65*
4. Was the enemy's ability to attack by air identified?	13	45			.53	.49	.49
5. Was the enemy's EW capability identified?	13	51			.31	.25	.02
6. Was the enemy's nuclear capability identified?	13	32			.44	.46	.19
7. Was the enemy's chemical capability identified?	13	39			.42	.50	.03
8. Overall, how well did the command group identify critical combat information and intelligence? (1B, 2A)	13		2.76	.57	.77**	.37	.40
9. Were all GSR elements effectively utilized?	13	52			.37	.15	-.27

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
10. Were personnel adequately deployed to observe the enemy prior to hostilities (e.g., on berm)?	13	99			.22	.18	.13
11. Was the TF intelligence collection plan properly prepared, and did it reflect analysis by the Battalion S2 of tasking responsibilities?	13		2.67	.68	.77**	.50	.45
12. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (2B)	13		2.71	.72	.81**	.55	.64*
13. Was the probable action of the enemy discussed?	13	52			.62	.67*	.79**
14. Overall, how well did the command group know enemy tactics and doctrine and compare it with combat information and intelligence to predict enemy intentions? (2C)	13		3.02	.41	.74**	.47	.51
15. Was relevant information from higher headquarters and adjacent units disseminated to company commanders (e.g., minefields)?	13		2.85	.58	.62	.51	.44
16. Were company commanders given an estimate of specifically what they would be facing?	13	36			.64*	.30	.54
17. Overall, did the command group disseminate combat information and intelligence that was event-oriented, and usable to the recipient? (2D)	13		2.87	.50	.81**	.71*	.58

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
B. Friendly considerations.							
18. Did the command group analyze friendly capabilities in terms of METT and submit requests for additional assets from brigade as appropriate? (1D)	13		3.19	.38	.45	.55	.69*
19. Did the command group select initial and successive battle positions which optimize considerations listed below:							
a. Critical avenues of approach blocked?	4	79			.45	.41	.65
b. Enemy forced to deploy and concentrate forces repeatedly?	4	58			-.47	-.60	.16
c. Effectiveness of own weapons maximized?	4	53			.75	.49	.96
d. Enemy forced to travel along exposed approaches?	4	67			-.18	.26	.79
e. Natural terrain/man made obstacles reinforced?	4	70			.47	-.02	.72
f. Battle positions facilitated transition to limited attack, defense, or withdrawal?	4	73			-.41	-.54	-.41
g. Overall, how well did the command group select initial and successive battle positions? (1H)	5		3.11	.67*	-.27	.28	.73

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
C. Organize for combat.							
20. Was the task organization clear?	13	60			.58	.56	.75**
21. Was the weighting of the combat power of the Task Force elements based on the intelligence estimate?	13	58			.57	.32	.56
22. Were the missions of all organic maneuver elements given?	13		3.38	.43	.38	.44	.53
23. Were the missions of all attached maneuver elements given?	13		3.09	.54	.20	.46	.70*
24. Were the missions/priorities of attached units given?	13		3.04	.50	.28	.46	.55
25. How well did the command group organize the Task Force, develop priorities, deploy TF elements, and develop scheme of maneuver that resulted in a plan which applied maximum combat power at the critical place? (3C)	13		3.37	.48	.49	.54	.56
D. Communicate/coordinate plans and orders.							
26. Were appropriate control measures defined?	12		3.37	.48	-.36	-.17	.32
27. Were control measures associated with recognizable terrain?	13	56			-.21	.09	.26

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
28. Were sufficient control measures (e.g., CFL, etc.) established?	13		3.44	.32	-.29	-.16	.34
29. Overall, how well did the command group select control measures which support the scheme of maneuver, facilitate fire and movement, permit rapid changes as the battle develops? (3D)	13		3.21	.54	-.37	-.12	.28
30. Was an alternate frequency given?	13	71			.38	.46	.61
31. Were company commanders given instructions on actions to be performed if jamming occurs?	13	64			.38	.40	.37
32. Were effective alternate means of communication developed in case of lost commo?	13	32			.55	.60	.30
33. Was wire utilized as an effective means of communication?	13	51			-.02	.23	.26
34. Did the command group develop a communication plan which satisfied the communication requirements of the specific mission, provides for COMSEC, specifies alternative means of communication, and insures operation of MIJI plan? (3F)	13		2.79	.55	-.10	.19	.51
35. Was the concept of operation clear?	13	68			.07	.36	.50
36. Did all elements understand what they were to do without extensive questioning?	13	46			.34	.16	.34

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
37. Did the operation order contain enough information for attached units?	13		2.86	.52	.08	.38	.60
38. Was a timely warning order given?	13	69			.28	.25	.25
39. Did the warning order contain all necessary information?	13		3.07	.76	.29	-.16	.29
40. Was sufficient time allowed to task force elements for their troop leading procedures?	13	44			-.19	-.16	.36
41. Overall, were the orders appropriate, clear, concise, and did they contain essential information; were they issued so as to allow TF elements maximum time to go through troop leading procedures; and were they coordinated with proper agencies? (3G)	13		2.79	.38	.29	.57	.69*
E. See the battlefield during the battle. 42. Overall, how well did the command group determine combat information and intelligence and shortfalls and aggressively gather information from all available/appropriate sources? (5B)	13		3.01	.50	.72*	.44	.68*
43. How well did the command group compare information received with known enemy tactics and doctrine and the developing situation to predict enemy intentions? (5C)	13		3.08	.43	.72*	.70*	.60

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
44. Was critical combat information and intelligence disseminated to the Task Force elements?	13		3.02	.57	.41	.59	.53
45. Was information disseminated to the Task Force elements within a time frame which permitted the commander to react?	13		3.04	.60	.51	.50	.53
46. How well did the command group disseminate information and intelligence that was event-oriented, usable to the recipient, accurate, and within a time frame which permitted the recipient to react? (5D)	13		3.00	.51	.28	.48	.57
F. Troop lead during the battle. 47. Were all attached combat units adequately controlled/monitored during the conduct of the exercise?	13		2.94	.47	.56	.59	.69*
48. How well did the command group supervise the execution of the Task Force order by Task Force elements and supporting units making corrections as necessary? (11A)	13		3.03	.43	.47	.61	.86**
G. Coordinate/communicate changes. 49. Did the Task Force elements understand what they were to do without excessive questions?	13	62			.18	-.43	.74*
50. Were all Task Force elements informed of changes?	13		3.01	.47	.09	.34	.50

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
51. Did the command group sometimes assume all commanders were monitoring radios for changes?	13	56			.08	-.36	-.07
52. Was adequate coordination made with adjacent units (e.g., for passage of lines)?	13	63			.36	.48	.75*
53. How well did the command group orally communicate changes (changed objectives, control measures, and scheme of maneuver) to the Task Force elements? (6B)	13		3.39	.47	-.18	.45	.56
H. Concentrate/shift combat power.							
54. How well did the command group read the battlefield and determine the precise place and time for maximum combat power needed to be employed? (8A)	13		2.60	.33	.33	.60	.42
55. When the enemy committed itself, did the command group adequately redeploy forces?	13		2.43	.35	.18	.43	.40
56. Were tactical decisions made consistent with the time-distance relationship?	13	39			.45	.56	.67*
57. Did the command group make adequate use of available assets, specifically:							
a. Air Force?	13	83			-.02	.19	.09
b. Field Artillery?	13	80			-.20	-.05	-.11
c. Scouts?	13	86			-.26	-.39	-.39

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
d. TOW's?	13	88			.07	.31	.10
e. Smoke?	13	68			-.45	.03	.22
f. CSC?	12	90			.39	.20	.22
58. If necessary, were additional units requested from brigade reserve?	9	56			-.37	-.37	.03
59. If reinforcements arrived, were they organized for combat and assigned battle positions and missions?	3	67			-.05	1.00	.80
60. Did the command group make adequate use of the ADA element?	13	66			.58	.47	.49
61. Did the command group make adequate use of the engineer element?	13	86			.25	.47	.68*
62. Did the command group piecemeal forces?	13	34			-.35	-.08	.01
63. Did the command group reinforce failure?	13	16			-.07	-.07	.14
64. Overall, how well did the command group concentrate its organic/attached/DS assets according to the weapons capabilities and movement of the enemy force? (8C)	13		2.76	.32	.33	.27	.20
65. Overall, how well did the command group direct organic/supporting forces to conduct economy of force operations in the thinly held areas (when concentrating combat power)? (8D)	13		2.80	.52	-.04	.40	.43

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
J. Enemy EW considerations.							
66. Was there too much communication?	13	88			.16	.27	.56
67. Did security violations occur during radio traffic?	13	54			.19	.28	.68*
68. Overall, how well did the command group adhere to communications and electronic security measures? (10A)	13		2.81	.44	.09	.34	.70*
69. When jamming occurred, did the command group recognize it?	13	77			-.13	-.39	-.69*
70. During jamming did they continue operation to avoid revealing its effectiveness?	13	78			-.24	-.43	-.15
71. Was a MIJI report promptly submitted to higher headquarters suing secure means of communication, if available?	13	64			.28	.19	.10
72. Did the command group direct a switch to spare frequency as a last resort, using proper authentication techniques?	13	23			.01	.30	.69*
73. Overall, how well did the command group recognize and react to enemy electronic warfare? (12A)	13		2.82	.36	.38	.37	.54
J. Other							
74. Was there sufficient intra-staff coordination between 2/3 and 1/4?	13	41			.42	.52	.23

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
75. Was there sufficient coordination between NCS and 2/3?	13	43			.38	.42	.32
76. Was the command group aware of the time-distance problem?	13	57			.39	.40	.67*
77. How well did the command group apply the time-distance relationship while maneuvering Task Force elements?	13		2.86	.55	.32	.39	.76**
78. Did the command group provide sufficient information to TF elements so that the commanders could perform their mission even if communication was lost for an extensive period?	13	63			.14	.05	.35
79. Was an adequate march order given?	13	58			.30	.60	.81**
80. Was the command group willing to make decisions without brigade guidance?	13		3.41	.54	.14	.21	.58
81. Did the battalion permit subordinate commanders to make reasonable decisions?	13	83			.18	.14	.18
82. Did the Task Force maneuver elements become decisively engaged because of battalion action?	12	56			.21	.18	-.25
83. Were company commanders allowed to make the decision to withdraw to prevent decisive engagement?	12		2.00	.57	-.12	-.07	-.26

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
84. What was the initial disengagement distances from the enemy?	12		2.01	.53	.38	.23	.59
85. What was the subsequent disengagement distances from the enemy?	13		2.33	.91	.24	.21	.41
86. What was the size of the battalion reserve?	13		12.2%	3.5%	-.12	-.07	.09
87. What was the initial distance the unit withdrew to break contact and provide time to set up hasty defense?	12		1.83	.36	.22	-.20	.02
88. What were the subsequent distances the unit withdrew to break contact and provide time to set up hasty defense?	13		1.82	.42	.44	.20	.29
89. Overall, how well did the command group perform in comparison to previous groups in the covering Force Operation?	13		2.66	.58	.57	.72*	.95**
90. Overall, how well did the S3 perform in comparison with previous S3's during the Covering Force Operation?	13		2.55	.75	.53		.68*
91. Overall, how well did this S2 perform in comparison with previous S2's during the Covering Force Operation?	13		2.46	.77	.	.53	.38

*P <.01.
**P <.001.

TABLE C-2b
S2/S3 and CC Ratings
Mechanized Attack

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
A. Intelligence preparation of the battlefield							
1. Were avenues of approach to the objective identified?	13	89			.39	.32	.26
2. Was the composition and size of defending force identified?	13	73			.54	.55	.46
3. Was the enemy's scheme of maneuver and fire support identified?	13	48			.56	.56	.48
4. Overall, how well did the command group identify critical combat information and intelligence? (1B, 2A)	13		2.97	.55	.45	.50	.42
5. Were all GSR elements effectively utilized?	12	10			.16	.36	.19
6. Was the TF intelligence collection plan properly prepared, and did it reflect analysis by the Battalion S2 or tasking responsibilities?	13		2.47	.76	.33	.37	.12
7. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (2B)	13		2.73	.65	.83**	.79**	.73*
8. Was the probable action of the enemy discussed?	13	51			.62	.63*	.54

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
9. Overall, how well did the command group know enemy tactics and doctrine and compare it with combat information and intelligence to predict enemy intentions? (2C)	13		3.17	.36	.56	.63	.71*
10. Was relevant information from higher headquarters and adjacent units disseminated to company commanders (e.g., minefields)?	13		2.98	.66	.73*	.68*	.49
11. Were commanders given an estimate of specifically what they would be facing?	13	53			.45	.42	.31
12. Overall, did the command group disseminate combat information and intelligence that was event-oriented, and usable to the recipient? (2D)	13		3.03	.47	.58	.55	.37
B. Friendly considerations.							
13. Did the command group analyze friendly capabilities in terms of METT and submit requests for additional assets from brigade as appropriate? (1D)	13		3.15	.58	.50	.52	.32
14. Did the command group select avenues of approach which optimize considerations listed below:							
a. Provided max cover and concealments?	13	86			-.19	.03	-.06
b. Minimized effects of obstacles?	13	75			.07	.14	-.03
c. Permitted mutual support and overwatch.	13	82			.16	.18	.02

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
d. Permitted effective employment of weapons?	13	80			.26	.31	.19
e. Facilitated control while permitting teams to deploy and maneuver.	13	80			.61	.67*	.59
f. Maximized TF and team mobility?	13	78			.13	.28	.11
g. Capitalized on enemy vulnerabilities?	13	66			.13	.38	.40
h. Minimized time for teams to close on objective?	13	85			.36	.50	.48
i. Facilitated logistical operations?	13	85			.00	.13	.03
C. Organize for combat							
15. Was the task organization clear?	13	74			.53	.49	.31
16. Was the weighting of the combat power of the Task Force elements based on the intelligence estimate?	13	67			.32	.52	.42
17. Were the missions of all organic maneuver elements given?	13		3.30	.47	.40	.45	.26
18. Were the missions of all attached maneuver elements given?	13		3.27	.54	.44	.50	.42
19. Were the missions/priorities of attached units given?	13		3.15	.53	.38	.48	.33

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
20. How well did the command group organize the Task Force, develop priorities, deploy TF elements, and develop scheme of maneuver that resulted in a plan which applied maximum combat power at the critical place? (3C)	13		3.31	.46	.43	.52	.32
D. Communicate/coordinate plans and orders.							
21. Were appropriate control measures defined?	13		3.56	.27	-.41	-.27	-.43
22. Were control measures associated with recognizable terrain?	13	71			-.15	-.03	-.22
23. Were sufficient control measures (e.g., CFL, etc.) established?	13		3.43	.32	-.49	-.33	-.41
24. Overall, how well did the command group select control measures which support the scheme of maneuver, facilitate fire and movement, permit rapid changes as the battle develops? (3D)	13		3.44	.51	-.06	.16	-.03
25. Was an alternate frequency given?	13	59			-.06	-.19	-.44
26. Were company commanders given instructions on actions to be performed if jamming occurs?	13	60			.20	.06	-.10
27. Were effective alternate means of communication developed in case of lost commo?	13	44			.14	-.08	-.30

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
28. Was wire utilized as an effective means of communication?	13	35			.31	.40	.31
29. Did the command group develop a communication plan which satisfies the communication requirements of the specific mission, provides for COMSEC, specifies alternative means of communication, and insures operation of MIJI plan? (3F)	13		2.74	.49	.17	.24	.01
30. Was the concept of operation clear?	13	61			.20	.31	.18
31. Did all elements understand what they were to do without extensive questioning?	13	53			.39	.54	.46
32. Did the operation order contain enough information for attached units?	13		3.11	.54	.32	.43	.38
33. Was a timely warning order given?	13	72			-.16	-.28	-.23
34. Did the warning order contain all necessary information?	13		3.12	.62	.39	.28	.44
35. Was sufficient time allowed to task force elements for their troop leading procedures?	13	44			-.18	.08	.06
36. Overall, were the orders appropriate, clear, concise, and did they contain essential information; were they issued so as to allow TF elements maximum time to go through troop leading procedures; and were they coordinated with proper agencies? (3G)	13		3.00	.56	.52	.63*	.59

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
E. See the battlefield during the battle.							
37. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (5B)	13		3.23	.46	.64*	.73*	.78**
38. How well did the command group compare information received with known enemy tactics and doctrine and the developing situation to predict enemy intentions? (5C)	13		3.24	.38	.15	.18	.15
39. Was critical combat information and intelligence disseminated to the Task Force elements?	13		3.13	.40	.38	.39	.42
40. Was information disseminated to the Task Force elements within a time frame which permitted the commander to react?	13		3.10	.43	.51	.54	.53
41. How well did the command group disseminate information and intelligence that was event-oriented, usable to the recipient, accurate, and within a time frame which permitted the recipient to react? (5D)	13		3.06	.44	.46	.55	.63
F. Troop lead during the battle.							
42. Were all attached combat units adequately controlled/monitored during the conduct of the exercise?	13		3.18	.52	.45	.58	.55

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
43. How well did the command group exercise the execution of the Task Force elements and supporting units making corrections as necessary?(11A)	.3		3.32	.52	.57	.72*	.70*
G. Coordinate/communicate changes. 44. Did the Task Force elements understand what they were to do without excessive questions?	13	72			.55	.69*	.65*
45. Were all Task Force elements informed of changes?	13		3.14	.44	.75*	.89**	.80**
46. Did the command group sometimes assume all commanders were monitoring radios for changes?	13	64			-.45	-.70*	-.75**
47. Was adequate coordination made with adjacent units (e.g., for passage of lines)?	13	63			.54	.59	.39
48. How well did the command group orally communicate changes (changed objectives, control measures, and scheme of maneuver) to the Task Force elements? (6B)	13		3.40	.43	.39	.48	.56
H. Concentrate/shift combat power. 49. How well did the command group read the battlefield and determine the precise place and time for maximum combat power needed to be employed? (8A)	13		3.10	.48	.61	.80**	.84**

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
50. Did the command group concentrate at the point where the enemy was likely to be weak?	13	69			.28	.58	.73*
51. Were tactical decisions made consistent with the time-distance relationship?	13	73			.69*	.83**	.89**
52. Did the command group make adequate use of available assets, specifically:							
a. Air Force?	13	79			.40	.63	.74*
b. Field Artillery?	13	83			.30	.49	.15
c. Scouts?	13	92			-.29	-.12	-.11
d. TOW's?	13	96			.14	-.05	-.20
e. Smoke?	13	83			.37	.48	.32
f. CSC?	12	84			.64	.64	.51
53. If necessary, were additional units requested from brigade reserve?	3	100			NV	NV	NV
54. If reinforcements arrived, were they organized for combat and assigned battle positions and missions?	1	100			NV	NV	NV
55. Did the command group make adequate use of the ADA element?	13	54			.45	.68*	.62

*P <.01.
**P <.001.
NV = No variation.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
56. Did the command group make adequate use of the engineer element?	13	55			-.06	.06	.12
57. Did the command group piecemeal forces?	13	44			-.06	-.30	.45
58. Did the command group reinforce failure?	13	41			-.08	-.39	-.62
59. Overall, how well did the command group concentrate its combat power at the critical place and time, maintaining pressure, penetrating enemy forward elements and seeking out enemy rear area? (8B)	13		3.05	.70	.28	.58	.73*
60. Overall, how well did the command group direct organic/supporting forces to conduct economy of force operations in the thinly held areas (when concentrating combat power)? (8D)	13		3.00	.59	.40	.60	.56
I. Enemy EW considerations.							
61. Was there too much communication?	13	73			-.38	-.62	-.67
62. Did security violations occur during radio traffic?	13	61			-.65*	-.62	-.77**
63. Overall, how well did the command group adhere to communications and electronic security measures? (10A)	13		2.81	.33	.54	.62	.74*
64. When jamming occurred, did the command	13	77			-.04	-.01	-.12

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
65. During jamming did they continue operation to avoid revealing its effectiveness?	13	82			.44	.27	.09
66. Was a MIJI report promptly submitted to higher headquarters using secure means of communication, if available?	12	40			.43	.45	.45
67. Did the command group direct a switch to spare frequency as a last resort, using proper authentication techniques?	13	36			.06	0	-.33
68. Overall, how well did the command group recognize and react to enemy electronic warfare? (12A)	13		2.85	.41	.53	.53	.54
J. Other							
69. Was there sufficient intra-staff coordination between 2/3 and 1/4?	13	38			.72*	.68*	.66*
70. Was there sufficient coordination between NCS and 2/3?	13	49			.54	.55	.44
71. Was the command group aware of the time-distance problem?	13	79			.33	.37	.42
72. How well did the command group apply the time-distance relationship while maneuvering Task Force elements?	13		3.21	.53	.79**	.82**	.83**

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
73. Did the command group provide sufficient information to TF elements so that the commanders could perform their mission even if communication was lost for an extensive period?	13	74			.70*	.70*	.55
74. Was an adequate march order given?	13	71			.38	.45	.31
75. Was the command group willing to make decisions without brigade guidance?	13		3.44	.43	.59	.73*	.70*
76. Did the battalion permit subordinate commanders to make reasonable decisions?	13	73			.53	.63*	.54
77. What was the size of the battalion reserve?	13		20.8%	11.5%	.15	.12	.14
78. Overall, how well did the command group perform in comparison to previous groups in the attack?	13		2.87	.79	.80**	.92**	.99**
79. Overall, how well did this S3 perform in comparison with previous S3's during the attack?	13		2.72	1.00	.87**		.90**
80. Overall, how well did this S2 perform in comparison with previous S2's during the attack?	13		2.54	.71		.87**	.77**

*P <.01.
**P <.001.

TABLE C-2c
S2/S3 and CC Ratings
Defense

Item	N	% YES	MEAN	SD	Correlation S2	S3	CC
A. Intelligence preparation of the battlefield.							
1. Were avenues of approach into defended areas identified?	10	77			.49	.62	.47
2. Was the composition and size of attacking force identified?	10	80			.74*	.60	.11
3. Was the enemy's scheme of maneuver and fire support identified?	10	77			.53	.56	.40
4. Was the enemy's ability to attack by air identified?	10	46			.65	.60	.37
5. Was the enemy's EW capability identified?	10	66			.62	.60	.07
6. Was the enemy's nuclear capability identified?	10	36			.19	.53	.51
7. Was the enemy's chemical capability identified?	10	44			.38	.60	.54
8. Overall, how well did the command group identify critical combat information and intelligence? (1B, 2A)	10		3.32	.71	.74*	.78*	.44
9. Were all GSR elements effectively utilized?	10	93			-.30	-.16	.09

*p <.01

Item	N	% YES	MEAN	SD	Correlation S2	S3	CC
10. Were personnel adequately deployed to observe the enemy prior to hostilities?	10	97			-.36	-.30	-.21
11. Was the TF intelligence collection plan properly prepared, and did it reflect analysis by the Battalion S2 of tasking responsibilities?	10		2.74	1.06	.39	.40	.10
12. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (2B)	10		3.23	.76	.83**	.83*	.45
13. Was the probable action of the enemy discussed?	10	82			.60	.67	.46
14. Overall, how well did the command group know enemy tactics and doctrine and compare it with combat information and intelligence to predict enemy intentions? (2C)	10		3.68	.60	.84**	.79*	.31
15. Was relevant information from higher headquarters and adjacent units disseminated to company commanders (e.g., minefields)?	10		3.63	.60	.91**	.80*	.26
16. Were company commanders given an estimate of specifically what they would be facing?	10	59			.50	.55	.40

*p <.01
**p <.001

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
17. Overall, did the command group disseminate combat information and intelligence that was event-oriented and usable to the recipient? (2D)	10		3.48	.55	.85**	.76*	.37
B. Friendly considerations.							
18. Did the command group analyze friendly capabilities in terms of METT and submit requests for additional assets from brigade as appropriate? (1D)	10		3.69	.42	.23	.56	.72*
19. Did the command group select battle positions which optimize considerations listed below:							
a. Block most critical avenues of approach into the defensive sector.	10	97			.17	.51	.69
b. Minimize vulnverabilities to enemy's frontal direct fire weapons and indirect fire weapons.	10	97			.17	.51	.69
c. Maximize capabilities of own weapons; permit engagement of targets at maximum effective range.	10	95			-.18	.29	.11
d. Exploit and reinforce natural terrain obstacles.	10	100			NV	NV	NV
e. Permit mutual support and overwatch	10	98			-.49	.06	.05

*p <.01
**p <.001
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
f. Facilitate control while permitting teams to deploy and maneuver	10	95			.18	.15	.33
g. Maximize TF and team mobility; allows for strong, quick counterattacks.	10	88			-.01	.60	.71
h. Capitalize on enemy vulnerabilities.	10	90			-.03	.09	.34
i. Reduce vulnerability to air attack.	10	97			.06	-.18	-.02
j. Overall, how well did the command group select battle positions? (1G)	10		4.17	.33	.27	.74*	.70
C. Organize for combat.							
20. Was the task organization clear?	10	79			-.02	.61	.70
21. Was the weighting of the combat power of the Task Force elements based on the intelligence estimate?	10	90			.06	.58	.85**
22. Were the missions of all organic maneuver elements givens?	10		3.84	.31	.15	.55	.61
23. Were the missions of all attached maneuver elements given?	10		3.89	.24	.27	.53	.55
24. Were the missions/priorities of attached units given?	10		3.82	.19	.17	.59	.77*

*p <.01
**p <.001

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
25. How well did the command group organize the Task Force, develop priorities, deploy TF elements, and develop scheme of maneuver that resulted in a plan which applied maximum combat power at the critical place? (3C)	10		3.79	.34	-.10	.54	.42
D. Communicate/coordinate plans and orders.							
26. Were appropriate control measures defined?	10		3.94	.15	.05	.21	.07
27. Were control measures associated with recognizable terrain?	10	95			.17	.31	.09
28. Were sufficient control measures (e.g., CFL, etc.) established?	10		3.89	.17	.22	.42	.30
29. Overall, how well did the command group select control measures which support the scheme of maneuver, facilitate fire and movement, permit rapid changes as the battle develops? (3D)	10		3.89	.17	.16	.19	.25
30. Was an alternate frequency given?	10	58			.27	.60	.78*
31. Were company commanders given instructions on actions to be performed if jamming occurs?	10	61			.21	.25	.38
32. Were effective alternate means of communication developed in case of lost commo?	10	62			.09	.56	.79*
33. Was wire utilized as an effective means of communication?	10	95			-.09	.22	.43

*p < .01

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
34. Did the command group develop a communication plan which satisfies the communication requirements of the specific mission provides for COMSEC, specifies alternative means of communication, and insures operation of MIJI plan? (3F)	10		3.23	.56	.33	.74*	.66
35. Was the concept of operation clear?	10	88			-.08	.50	.66
36. Did all elements understand what they were to do without extensive questioning?	10	86			-.06	.41	.58
37. Did the operation order contain enough information for attached units?	10		3.63	.47	-.02	.50	.59
38. Was a timely warning order given?	10	93			-.26	.35	.54
39. Did the warning order contain all necessary information?	10		3.87	.48	-.62	-.02	.54
40. Was sufficient time allowed to task force elements for their troop leading procedures?	10	68			-.57	-.01	.44
41. Overall, were the orders appropriate, clear, concise, and did they contain essential information; were they issued so as to allow TF elements maximum time to go through troop leading procedures; and were they coordinated with proper agencies? (3G)	10		3.60	.57	-.35	.37	.53

*p <.01

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
E. See the battlefield during the battle.							
42. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (5B)	10		3.62	.29	.46	.67	.59
43. How well did the command group compare information received with known enemy tactics and doctrine and the developing situation to predict enemy intentions? (5C)	10		3.59	.26	.02	.25	.53
44. Was critical combat information and intelligence disseminated to the Task Force elements?	10		3.57	.41	.23	.59	.65
45. Was information disseminated to the Task Force elements within a time frame which permitted the commander to react?	10		3.54	.43	.25	.54	.72*
46. How well did the command group dissiminate information and intelligence that was event-oriented, usable to the recipient, accurate, and within a time frame which permitted the recipient to react? (5D)	10		3.58	.39	.08	.62	.74*
F. Troop lead during the battle.							
47. Were all attached combat units adequately controlled/monitored during the conduct of the exercise?	10		3.92	.20	-.27	.26	.43

*p <.01

Item	N	% YES	MEAN	SD	Correlation S2	S3	CC
48. How well did the command group supervise the execution of the Task Force order by Task Force elements and supporting units making corrections as necessary? (11A)	10		3.91	.27	.10	.53	.76*
G. Coordinate/communicate changes. 49. Did the Task Force elements understand what they were to do without excessive questions?	10	91			-.18	.46	.60
50. Were all Task Force elements informed of changes?	10		3.68	.35	-.24	.21	.51
51. Did the command group sometimes assume all commanders were monitoring radios for changes?	10	56			-.28	-.25	.42
52. Was adequate coordination made with adjacent units (e.g., for passage of lines)?	10	92			-.11	.07	.33
53. How well did the command group orally communicate changes (changed objectives, control measures, and scheme of maneuver) to the Task Force elements? (6B)	10		3.82	.29	-.15	.33	.80*

*p <.01

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
48. How well did the command group supervise the execution of the Task Force order by Task Force elements and supporting units making corrections as necessary? (11A)	10		3.91	.27	.10	.53	.76*
G. Coordinate/communicate changes.							
49. Did the Task Force elements understand what they were to do without excessive questions?	10	91			-.18	.46	.60
50. Were all Task Force elements informed of changes?	10		3.68	.35	-.24	.21	.51
51. Did the command group sometimes assume all commanders were monitoring radios for changes?	10	56			-.28	-.25	.42
52. Was adequate coordination made with adjacent units (e.g., for passage of lines)?	10	92			-.11	.07	.33
53. How well did the command group orally communicate changes (changed objectives, control measures, and scheme of maneuver) to the Task Force elements? (6B)	10		3.82	.29	-.15	.33	.80*

*p <.01

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
H. Concentrate/shift combat power.							
54. How well did the command group read the battlefield and determine the precise place and time for maximum combat power needed to be employed? (8A)	10		3.67	.36	-.08	-.37	-.52
55. When the enemy committed itself, did the command group adequately redeploy forces?	10		3.58	.34	.14	.37	.56
56. Were tactical decisions made consistent with the time-distance relationship?	10	67			.80*	.48	.25
57. Did the command group make adequate use of available assets, specifically:							
a. Air Force?	10	88			.38	-.23	-.53
b. Field Artillery?	10	85			.56	.53	.44
c. Scouts?	10	93			.18	.25	.50
d. TOW's?	10	100			NV	NV	NV
e. Smoke?	10	76			.48	.40	.58
f. CSC?	10	85			.37	-.30	-.30
58. If necessary, were additional units requested from brigade reserve?	9	100			NV	NV	NV
59. If reinforcements arrived, were they organized for combat and assigned battle positions and missions?	9	89			.14	-.10	.03

*p <.01
NV = No variation

Item	N	% YES	MEAN	SD	Correlation S2	S3	CC
60. Did the command group make adequate use of the ADA element?	8	77			-.29	.20	.49
61. Did the command group make adequate use of the engineer element?	10	89			.04	.48	.77*
62. Did the command group piecemeal forces?	10	19			.06	.20	-.30
63. Did the command group reinforce failure?	10	14			-.49	-.25	-.07
64. Overall, how well did the command group concentrate its organic/attached DS assets according to the weapons capabilities and movement of the enemy force? (8C)	10		3.68	.35	.05	.32	.53
65. Overall, how well did the command group direct organic/supporting forces to conduct economy force operations in the thinly held areas (when concentrating combat power)? (8D)	10		3.82	.43	-.06	.07	.29
I. Enemy EW considerations.							
66. Was there too much communication?	10	84			-.22	-.35	-.21
67. Did security violations occur during radio traffic?	10	50			.28	.22	.17

*p <.01

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CC
68. Overall, how well did the command group adhere to communications and electronic security measures? (10A)	10		3.05	.40	.63	.56	.41
69. When jamming occured, did the command group recognize it?	10	84			.05	.24	.62
70. During jamming did they continue operation to avoid revealing its effectiveness?	10	81			-.24	-.12	.27
71. Was a MIJI report promptly submitted to higher headquarters using secure means of communication, if available?	10	65			.06	.23	.38
72. Did the command group direct a switch to spare frequency as a last resort, using proper authentication techniques?	10	34			-.22	.08	.38
73. Overall, how well did the command group recognize and react to enemy electronic warfare? (12A)	10		3.01	.58	-.11	.41	.53
J. Other. 74. Was there sufficient intra-staff coordination between 2/3 and 1/4?	10	75			.65	.37	.37
75. Was ther sufficient coordination between NCS and 2/3?	10	85			.46	.35	.22
76. Was the command group aware of the time-distance problem?	10	79			.37	.47	.56

Item	N	% YES	MEAN	SD	Correlation S2	S3	CC
77. How well did the command group apply the time-distance relationship while maneuvering Task Force elements?	10		3.40	.41	.80*	.71*	.26
78. Did the command group provide sufficient information to TF elements so that the commanders could perform their mission even if communication was lost for an extensive period?	10	78			.00	.30	.72*
79. Was an adequate march order given?	10	89			-.25	.24	.44
80. Was the command group willing to make decisions without brigade guidance?	10		3.72	.35	.46	.27	.15
81. Did the battalion permit subordinate commanders to make reasonable decisions?	10	96			.53	.67	.54
82. What was the size of the battalion reserve?	10		20.7	5.0	-.04	.33	.37
83. Overall, how well did the command group perform in comparison to previous groups in the Defense?	10		3.70	.76	.23	.77*	.94**
84. Overall, how well did this S3 perform in comparison with previous S3's during the Defense?	10		3.40	.80	.64		.71*
85. Overall, how well did this S2 perform in comparison with previous S2's during the Defense?	10		3.38	.72	.64		.19

*p <.01
**p <.001

TABLE C-2d
S2/S3 and CC Ratings
Non-Mechanized Attack

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
A. Intelligence preparation of the battlefield							
1. Were avenues of approach to the objective identified?	10	88			.43	.78*	.74*
2. Was the composition and size of defending force identified?	10	82			.30	-.29	.17
3. Was the enemy's scheme of maneuver and fire support identified?	10	69			.66	.20	.14
4. Overall, how well did the command group identify critical combat information and intelligence? (1B, 2A)	10		3.50	.40	.50	.23	.29
5. Were all GSR elements effectively utilized?	10	56			.28	.26	.46
6. Was the TF intelligence collection plan properly prepared, and did it reflect analysis by the Battalion S2 or tasking responsibilities?	10		2.53	.62	.75*	.25	.02
7. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (2B)	10		3.24	.35	.70	.51	.55

*p <.01.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
8. Was the probable action of the enemy discussed?	10	75			.47	.40	.41
9. Overall, how well did the command group know enemy tactics and doctrine and compare it with combat information and intelligence to predict enemy intentions? (2C)	10		3.61	.40	.57	.56	.79*
10. Was relevant information from higher headquarters and adjacent units disseminated to company commanders (e.g., minefields)?	10		3.30	.37	.45	.04	.43
11. Were commanders given an estimate of specifically what they would be facing?	10	74			.26	-.41	.03
12. Overall, did the command group disseminate combat information and intelligence that was event oriented, and usable to the recipient? (2D)	10		3.36	.34	.19	-.32	.17
B. Friendly considerations.							
13. Did the command group analyze friendly capabilities in terms of METT and submit requests for additional assets from brigade as appropriate? (1D)	10		3.75	.26	-.21	-.04	.38
14. Did the command group select avenues of approach which optimize considerations listed below:							
a. Provided max cover and concealments?	10	95			.40	.19	.47

*P <.01..

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
b. Minimized effects of obstacles?	10	88			.51	.46	.70
c. Permitted mutual support and overwatch?	10	83			.33	-.03	.36
d. Permitted effective employment of weapons?	10	81			.12	.01	.35
e. Facilitated control while permitting teams to deploy and maneuver.	10	86			.26	.48	.57
f. Maximized TF and team mobility?	10	88			-.01	-.12	.22
g. Capitalized on enemy vulnerabilities?	10	82			.28	.50	.69
h. Minimized time for teams to close on objective?	10	92			0	.20	.23
i. Facilitated logistical operations?	10	89			.34	.71	.79*
C. Organize for combat							
15. Was the task organization clear?	10	91			.13	.41	.51
16. Was the weighting of the combat power of the Task Force elements based on the intelligence estimate?	10	76			.54	.58	.53
17. Were the missions of all organic maneuver elements given?	10		3.70	.34	.05	.32	.62
18. Were the missions of all attached maneuver elements given?	10		3.88	.11	-.11	.21	.53

*p <.01.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
19. Were the missions/priorities of attached units given?	10		3.76	.20	-.03	.55	.57
20. How well did the command group organize the Task Force, develop priorities, deploy TF elements, and develop scheme of maneuver that resulted in a plan which applied maximum combat power at the critical place? (3C)	10		3.52	.43	.25	.61	.89**
D. Communicate/coordinate plans and orders.							
21. Were appropriate control measures defined?	10		3.66	.45	.40	.76*	.86**
22. Were control measures associated with recognizable terrain?	10	88			.14	.06	
23. Were sufficient control measures (e.g., CFL, etc.) established?	10		3.60	.52	.35	.70	.80*
24. Overall, how well did the command group select control measures which support the scheme of maneuver, facilitate fire and movement, permit rapid changes as the battle develops? (3D)	10		3.57	.51	.45	.73*	.77*
25. Was an alternate frequency given?	10	51			.20	.35	.55
26. Were company commanders given instructions on actions to be performed if jamming occurs?	10	49			-.01	.26	.44

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
27. Were effective alternate means of communication developed in case of lost commo?	10	55			-.23	.18	.30
28. Was wire utilized as an effective means of communication?	10	98			.23	.76*	.59
29. Did the command group develop a communication plan which satisfies the communication requirements of the specific mission, provides for COMSEC, specifies alternative means of communication, and insures operation of MIJI plan? (3F)	10		3.07	.62	.11	.37	.66
30. Was the concept of operation clear?	10	83			.06	.13	.33
31. Did all elements understand what they were to do without extensive questioning?	10	79			.34	.53	.79*
32. Did the operation order contain enough information for attached units?	10		3.76	.21	.43	.61	.76*
33. Was a timely warning order given?	10	82			.35	.04	-.26
34. Did the warning order contain all necessary information?	10		3.77	.23	-.33	.51	.36
35. Was sufficient time allowed to task force elements for their troop leading procedures?	10	81			.18	.51	.59
36. Overall, were the orders appropriate, clear, concise, and did they contain essential information; were they issued so as to allow TF elements maximum time to go through troop leading procedures; and were they coordinated with proper agencies? (3G)	10		3.45	.42	.15	.65	.87**

*P <.01.
**P <.001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
E. See the battlefield during the battle.							
37. Overall, how well did the command group determine combat information and intelligence shortfalls and aggressively gather information from all available/appropriate sources? (5B)	10		3.45	.36	.70	.77**	.67
38. How well did the command group compare information received with known enemy tactics and doctrine and the developing situation to predict enemy intentions? (5C)	10		3.58	.29	.72*	.54	.66
39. Was critical combat information and intelligence disseminated to the Task Force elements?	10		3.43	.42	.58	.38	.62
40. Was information disseminated to the Task Force elements within a time frame which permitted the commander to react?	10		3.45	.37	.58	.54	.74*
41. How well did the command group disseminate information and intelligence that was event-oriented, usable to the recipient, accurate, and within a time frame which permitted the recipient to react? (5D)	10		3.45	.37	.58	.54	.74*
F. Troop lead during the battle.							
42. Were all attached combat units adequately controlled/monitored during the conduct of the exercise?	10		3.80	.27	.31	.73*	.88**

*P < .01.
**P < .001.

Item	N	% YES	MEAN	SD	Correlation S2	Correlation S3	Correlation CG
43. How well did the command group supervise the execution of the Task Force elements and supporting units making corrections as necessary? (11A)	10	•	3.87	.36	.03	.69	.87**
G. Coordinate/communicate changes. 44. Did the Task Force elements understand what they were to do without excessive questions?	10	92			.47	.53	.70*
45. Were all Task Force elements informed of changes?	10		3.56	.31	.10	.18	.71
46. Did the command group sometimes assume all commanders were monitoring radios for changes?	10	66			-.15	-.05	-.56
47. Was adequate coordination made with adjacent units (e.g., for passage of lines)?	9	94			-.02	-.55	.10
48. How well did the command group orally communicate changes (changed objectives control measures, and scheme of maneuver) to the Task Force elements? (6B)	10		3.78	.32	-.10	.64	.86**
H. Concentrate/shift combat power. 49. How well did the command group read the battlefield and determine the precise place and time for maximum combat power needed to be employed? (8A)	10		3.75	.42	.33	.50	.79*

*P < .01.
**P < .001.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
50. Did the command group concentrate at the point where the enemy was likely to be weak?	10	73			.22	-.05	-.42
51. Were tactical decisions made consistent with the time-distance relationship?	10	94			.23	.76*	.59
52. Did the command group make adequate use of available assets, specifically:							
a. Air Force?	10	83			-.04	.18	.42
b. Field Artillery?	10	84			.56	.03	.23
c. Scouts?	10	87			-.05	.11	.34
d. TOW's?	10	97			.10	-.13	.04
e. Smoke?	10	80			.45	.25	.39
f. CSC?	10	82			.07	-.02	.13
53. If necessary, were additional units requested from brigade reserve?	6	75			-.16	-.26	-.05
54. If reinforcements arrived, were they organized for combat and assigned battle positions and missions?	4	62			-.76	-.37	-.39
55. Did the command group make adequate use of the ADA element?	7	67			-.79	-.11	-.06
56. Did the command group make adequate use of the engineer element?	10	57			-.08	.39	.44

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
57. Did the command group piecemeal forces?	10	21			.03	-.06	-.30
58. Did the command group reinforce failure?	10	21			.26	.17	.01
59. Overall, how well did the command group concentrate its combat power at the critical place and time, maintaining pressure, penetrating enemy forward elements and seeking out enemy rear area? (8B)	10		3.32	.35	-.17	.63	.82*
60. Overall, how well did the command group direct organic/supporting forces to conduct economy of force operations in the thinly held areas (when concentrating combat power)? (8D)	10		3.49	.44	-.09	.43	.39
I. Enemy EW considerations.							
61. Was there too much communication?	10	40			-.22	-.63	-.43
62. Did security violations occur during radio traffic?	10	61			-.38	-.48	-.71
63. Overall, how well did the command group adhere to communications and electronic security measures? (10A)	10		3.29	.56	.15	.66	.74*
64. When jamming occurred, did the command group recognize it?	9	85			.05	.39	.51
65. During jamming did they continue operation to avoid revealing its effectiveness?	9	82			-.13	.03	.35
66. Was a MIJI report promptly submitted to higher headquarters using secure means of communication, if available?	8	65			.05	.00	.41

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
67. Did the command group direct a switch to spare frequency as a last resort, using proper authentication techniques?	9	43			-.18	.53	.54
68. Overall, how well did the command group recognize and react to enemy electronic warfare? (12A)	9		3.11	.67	-.04	.54	.63
J. Other							
69. Was there sufficient intra-staff coordination between 2/3 and 1/4?	10	66			.28	.26	-.08
70. Was there sufficient coordination between NCS and 2/3?	10	83			.58	.46	.30
71. Was the command group aware of the time-distance problem?	10	94			.50	.69	.29
72. How well did the command group apply the time-distance relationship while maneuvering Task Force elements?	10		3.62	.51	.32	.72*	.75*
73. Did the command group provide sufficient information to TF elements so that the commanders could perform their mission even if communication was lost for an extensive period?	10	77			-.10	.48	.58
74. Was an adequate march order given?	10	92			.12	.65	.55

*P <.01.

Item	N	% YES	MEAN	SD	Correlation S2	S3	CG
75. Was the command group willing to make decisions without brigade guidance?	10		3.88	.30	.28	.34	.55
76. Did the battalion permit subordinate commanders to make reasonable decisions?	10	100			-	-	-
77. What was the size of the battalion reserve?	10		26.9%	10.5%	.62	.20	.09
78. Overall, how well did the command group perform in comparison to previous groups in the attack?	10		3.53	.70	.14	.75*	.94**
79. Overall, how well did this S3 perform in comparison with previous S3's during the attack?	10		3.32	.51	.38		.73*
80. Overall, how well did this S2 perform in comparison with previous S2's during the attack?	10		3.17	.55		.38	.17

*P <.01.
**P <.001.

TABLE C-3a
FSO Ratings
Covering Force

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
1. Plan use of organic/attached and non-organic fires. (II)	Plan, continuously up-dated, provides for organic/attached/non-organic supporting preplanned fires, fires against target of opportunity suppression, surprise and deception, air defense coverage while allowing Task Force to maneuver freely.						
	a. Did fire plan effectively utilize organic heavy mortars?	10	20			.88**	.32
	b. Did fire plan effectively utilize supporting arty?	10	70			.42	-.27
	c. Was appropriate target list developed?	10	90			.21	-.08
	d. Was adequate coordination with FOs made?	10	80			.32	-.42
	e. Overall, how well did the command group perform relative to the standard?	10		3.40	1.08	.85**	.11

**P <.001.

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
2. Determine priority of fires.	Priority of fires, to include air defense fires, is given to Task Force elements to support the scheme of maneuver. Priorities for counter-fires and suppressive fires are established. If appropriate, dedicated battery is specified.						
	a. Was priority of fires given to appropriate TF element(s) to support scheme of maneuver?	10	50			.64	.27
	b. Was suppression of fires considered?	10	50			.32	.70
	c. Overall, how well did the command group perform relative to the standard?	10		3.10	1.29	.87**	.31
3. Conduct initial fire support coordination. (1L)	Determine fire support/target acquisition assets available; determine fire support coordination measures.						
	a. Did the command group effectively determine fire support/target acquisition assets available?	10	60			.52	.28
	b. Did the command group determine fire support coordination measures?	10	70			.42	.52
	c. Overall, how well did the command group perform relative to the standard?	10		3.20	1.14	.85**	.40

**P < .001.

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Coordination FSO	Coordination CG
4. Modify fire support plan. (7A)	Priority of fires which supports the new scheme of maneuver is immediately communicated to supporting and supported units. Requests for immediate fire support are received and assigned to the appropriate fire support agencies. Missions are assigned which support anticipated developments.						
	a. During the battle was priority of fires supporting new scheme of maneuver immediately communicated to supporting and supported units?	10	50			.16	-.04
	b. Were requests for immediate fire support received and assigned to appropriate fire support agencies?	10	50			.64	.56
	c. Overall, how well did the command group perform relative to the standard?	10		2.90	.99	.75**	.56
5. Overall, how well did this Fire Support Element (interacting with the command group) perform in comparison with previous groups in Covering Force operations?		11		2.64	1.36		.20

**P <.001.

TABLE C-3b
FS Ratings
Mechanized Attack

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
1. Plan use of organic/attached and non-organic fires. (1I)	Plan, continuously up-dated, provides for organic/attached/non-organic supporting preplanned fires, fires against target of opportunity suppression, surprise and deception, air defense coverage while allowing Task Force to maneuver freely.						
	a. Did fire plan effectively utilize organic heavy mortars?	11	.55			.84**	.29
	b. Did fire plan effectively utilize supporting arty?	11	1.00			NV	NV
	c. Was adequate coordination with FOs made?	11	.82			.51	-.39
	d. Overall, how well did the command group perform relative to the standard?	11		3.45	1.04	.92**	.30
2. Determine priority of fires. (1J)	Priority of fires, to include air defense fires, is given to Task Force elements to support the scheme of maneuver. Priorities for counterfires are established. If appropriate, dedicated battery is specified.						

**p < .001.
NV = No variation

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
	a. Was priority of fires given to appropriate TF element(s) to support scheme of maneuver?	11	82			.34	-.24
	b. Was suppression of fires considered?	11	55			.49	.44
	c. Overall, how well did the command group perform relative to the standard?	11		3.55	1.04	.91**	.25
3. Conduct initial fire support coordination. (1L)	Determine fire support/target acquisition assets available; determine fire support coordination measures.						
	a. Did the command group effectively determine fire support/target acquisition assets available?	11	64			.67	.39
	b. Did the command group determine fire support coordination measures?	10	80			.51	-.39
	c. Overall, how well did the command group perform relative to the standard?	11		3.36	1.12	.92**	.17
4. Modify fire support plan. (7A)	Priority of fires which supports the new scheme of maneuver is immediately communicated to supporting and supported units. Requests for immediate fire support are received and assigned to the appropriate fire support agencies. Missions are assigned which support anticipated developments.						

**p < .001.

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
	a. During the battle was priority of fires supporting new scheme of maneuver immediately communicated to supporting and supported units?	11	55			.84**	.29
	b. Were requests for immediate fire support received and assigned to appropriate fire support agencies?	11	73			.51	.66
	c. Overall, how well did the command group perform relative to the standard?	11		3.27	1.27	.94**	.40
5. Overall, how well did this Fire Support Element (interacting with the command group) perform in comparison with previous groups in the attack?		11		3.00	1.34		.40

**p <.001.

TABLE C-3c
Defense
FS Ratings

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
1. Plan use of organic/attached and non-organic fires. (1I	Plan, continuously up-dated, provides for organic/attached/non-organic supporting preplanned fires, fires against target of opportunity suppression, surprise and deception, air defense coverage while allowing Task Force to maneuver freely.						
	a. Did fire plan effectively utilize organic heavy mortars?	10	40			.61	.18
	b. Did fire plan effectively utilize supporting arty?	10	100			NV	.99
	c. Was appropriate target list developed?	10	80			0	-.40
	d. Was adequate coordination with FOs made?	10	90			.67	-.25
	e. Overall, how well did the command group perform relative to the standard?	10		4.00	.82	.77*	.08

*p. < 01
NV = No variation

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
2. Determine priority of fires. (1J)	Priority of fires, to include air defense fires, is given to Task Force elements to support the scheme of maneuver. Priorities for counterfires and suppressive fires are established. If appropriate, dedicated battery is specified.						
	a. Was priority of fires given to appropriate TF element(s) to support scheme of maneuver?	10	90			.67	-.25
	b. Was suppression of fires considered?	10	70			0	-.07
	c. Overall, how well did the command group perform relative to the standard?	10		3.90	.7	.71*	-.04
3. Conduct initial fire support coordination. (1L)	Determine fire support/target acquisition assets available; determine fire support coordination measures.						
	a. Did the command group effectively determine fire support/target acquisition assets available?	10	80			.75*	.33

*p <.01

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
	b. Did the command group determine fire support coordination measures?	10	100			NV	NV
	c. Overall, how well did the command group perform relative to the standard?	10		3.90	.88	.84**	.06
4. Modify fire support plan. (7A)	Priority of fires which supports the new scheme of maneuver is immediately communicated to supporting and supported units. Requests for immediate fire support are received and assigned to the appropriate fire support agencies. Missions are assigned which support anticipated developments.						
	a. During the battle was priority of fires supporting new scheme of maneuver immediately communicated to supporting and supported units?	10	70			.65*	-.05
	b. Were requests for immediate fire support received and assigned to appropriate fire support agencies?	10	100			NV	NV
	c. Overall, how well did the command group perform relative to the standard?	9		3.89	.93	.88**	.33

*p <.01
**p <.001
NV = No variation

Subtask	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
5. Overall, how well did this Fire Support Element (interacting with the command group) perform in comparison with previous groups in Covering Force operations?	10		4.00	1.05		.07

TABLE C-3d
Non-Mechanized Attack
FS Ratings

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
1. Plan use of organic/attached and non-organic fires. (1I)	Plan, continuously up-dated, provides for organic/attached/non-organic supporting preplanned fires, fires against target of opportunity suppression, surprise and deception, air defense coverage while allowing Task Force to maneuver freely.						
	a. Did fire plan effectively utilize organic heavy mortors?	10	50			.60	.14
	b. Did fire plan effectively utilize supporting arty?	10	100			NV	NV
	c. Was adequate coordination with FOs made?	10	90			.33	-.23
	d. Overall, how well did the command group perform relative to the standard?	10		4.00	.67	.63	-.05
2. Determine priority of fires. (1J)	Priority of fires, to include air defense fires, is given to Task Force elements to support the scheme of maneuver. Priorities for counterfires and suppressive fires are established. If appropriate, dedicated battery is specified.						

NV = No variation

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
	a. Was priority of fires given to appropriate TF element(s) to support scheme of maneuver?	10	100			NV	NV
	b. Was suppression of fires considered?	10	80			.25	.43
	c. Overall, how well did the command group perform relative to the standard?	10		4.20	.63	.67	.34
3. Conduct initial fire support coordination. (1L)	Determine fire support/target acquisition assets available; determine fire support coordination measures.						
	a. Did the command group effectively determine fire support/ target acquisition assets available?	10	80			.50	.27
	b. Did the command group determine fire support coordination measures?	10	100			NV	NV
	c. Overall, how well did the command group perform relative to the standard?	10		4.10	.74	.71*	.16
4. Modify fire support plan. (7A)	Priority of fires which supports the new scheme of maneuver is immediately communicated to supporting and supported units. Requests for immediate fire support are received and assigned						

*p <.01
NV = No variation

Subtask	Standard and Key Events	N	% YES	MEAN	SD	Correlation FSO	Correlation CG
4. con't	to the appropriate fire support agencies. Missions are assigned which support anticipated developments.						
	a. During the battle was priority of fires supporting new scheme of maneuver immediately communicated to supporting and supported units?	8	88			.31	.59
	b. Were requests for immediate fire support received and assigned to appropriate fire support agencies?	10	100			NV	NV
	c. Overall, how well did the command group perform relative to the standard?	10		4.20	.63	.67	.34
5. Overall, how well did this Fires Support Element (interacting with the command group) perform in comparison with previous groups in the Attack?		10		4.00	.74		.18

NV = No variation

TABLE C-4a
Covering Force
TOC Monitor Ratings

Task/Subtask	N	MEAN	SD	Correlation MSN	Correlation CDR	Correlation CG
1. Develop plan based on mission						
A. Analyze mission	12	3.50	.67	-.08	-.23	-.17
B. Identify critical intel	12	3.25	.97	-.14	-.30	-.26
C. Identify critical friendly information	12	3.25	.87	-.17	-.05	-.06
D. Analyze friendly capabilities	12	3.42	.67	-.08	.29	.47
E. Select/control key terrain	12	3.50	.67	-.43	-.36	-.12
G. Select battle positions (defense)	10	3.20	.79	-.17	-.11	-.03
H. Select delay positions, covering force positions and routes of withdrawal	12	3.33	.78	.09	-.07	-.15
I. Plan use of organic/attached and non-organic fires	12	2.75	.75	.35	.00	-.13
J. Determine priority of fires	12	3.08	1.00	.10	-.14	-.49
K. Determine fire support requirements	12	3.25	.97	-.03	.09	.38
L. Conduct initial fire support coordination	12	3.08	.90	.12	.25	.19

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
2. Initiate intel preparation of the battlefield						
A. Identify critical intelligence	11	2.55	.93	-.28	-.22	.08
B. Gather critical intelligence	11	2.55	.82	.00	-.13	-.03
C.. Analyze enemy	11	2.64	.92	-.28	-.46	.06
D. Disseminate critical intel	11	2.73	.90	-.30	-.12	.22
3. Prepare and organize the battlefield						
A. Determine critical place	12	3.42	.79	.08	.06	-.42
B. Select a course of action	12	3.58	.67	-.10	-.25	-.27
C. Organize for combat	12	3.42	.90	-.06	-.06	.08
D. Select control measures	12	3.25	.97	.21	.18	.04
E. Plan organic, attached and non-organic supporting fires and determine priority	12	3.25	.97	.10	-.36	.08
F. Develop a communication plan	9	3.33	.71	-.38	-.16	.01
G. Communicate/coordinate plans and orders	11	2.73	.79	-.29	-.54	.49
H. Reinforce terrain	10	3.30	.48	.28	-.08	.00
I. Employ active/passive security measures (e.g., camouflage, ELSEC, COMSEC, dummy positions or equipment, inoperative equipment realistically positioned and camouflaged)	5	2.60	.55	.76	-.52	-.59

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
J. Provide supplies	9	3.56	.88	-.52	-.25	-.19
K. Maintain equipment	5	3.60	1.14	-.94	-.45	.24
4. Troop lead						
A. Supervise preparations	11	3.64	.67	-.51	.15	-.04
B. Supervise compliance with TF order	9	3.56	.73	-.43	-.31	-.23
C. Conduct rehearsals	0					
5. See the battlefield during the battle						
A. Identify critical intelligence	12	2.75	.97	.03	-.47	.01
B. Gather critical intelligence	12	2.92	.90	-.12	-.43	.13
C. Analyze enemy	12	2.42	.79	.37	-.17	.00
D. Disseminate critical intel	11	3.00	.89	-.13	-.36	.02
6. Control and coordinate combat operations						
A. Modify scheme of maneuver	12	3.17	.83	.57	.52	-.40
B. Coordinate/communicate changes	12	3.17	.72	.29	.10	-.16
C. Supervise execution	11	3.55	.82	-.13	.63	-.09
D. Maintain the battlefield	10	3.30	.67	.51	.30	-.21

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
7. Employ fires and other combat support assets						
A. Modify fire support plan	12	2.92	.90	.27	-.01	.07
B. Employ fires (to include organic/attached weapons systems and supporting arty, air defense, TAC Air and Attack Helicopters)	12	3.00	.85	.57	.25	.12
C. Employ other combat support assets	10	3.30	.82	.06	-.16	.11
8. Concentrate/shift combat power						
A. Determine critical place and time	12	2.92	1.16	.61	.76*	-.36
B. Concentrate/shift combat power in the defense or retrograde	12	2.83	.72	.53	.76*	-.34
C. Protect thinly held areas	11	3.45	.93	-.07	.17	-.08
9. Manage combat service support assets						
A. Arm and fuel the system	9	3.00	.87	.00	.29	.00
B. Fix the system	9	3.00	.87	.00	.29	.00
C. Support the troops	10	3.00	.82	.00	.26	.00
D. Integrate CSS into scheme of maneuver	10	3.10	.88	-.16	.08	.04
11. Troop lead during battle						
A. Supervise compliance with TF order	10	3.60	.84	.49	.38	-.18

*p <.01

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
12. React to situations requiring special actions						
A. React to enemy electronic warfare	12	3.00	1.21	.29	-.22	.01
To what degree was the mission accomplished?	11	4.09	.83		.23	-.31
Was the planning of the command group complete and efficient; did it cover all contingencies?	9	3.11	1.05	-.58	.41	.22
Was the decision making of the command group timely and correct in view of the situation?	9	3.33	1.22	-.40	.78*	.35
Was the implementation of decisions characterized by general supervision, delegation of appropriate responsibilities, and timely and appropriate follow-up?	9	2.89	.93	-.41	.64	.32
Was the communication of the command group both upward and downward, timely, complete, accurate, and efficient?	8	2.75	.46	-.65	.34	.32
Was the responsiveness of the command group to requests and requirements of subordinate units prompt, helpful and accurate?	9	3.33	.87	-.64	.70	.20
Overall, how effective was this command group?	10	3.30	.82	-.18	.70	.01
How effective was the battalion commander?	10	4.10	1.10	.23		-.11

*p <.01

TABLE C-4b
Mechanized Attack
TOC Monitor Ratings

Task/Subtask	N	MEAN	SD	Correlation MSN	Correlation CDR	Correlation CG
1. Develop plan based on mission						
A. Analyze mission	12	3.33	.89	-.17	.00	-.07
B. Identify critical intel	11	2.73	1.19	-.13	-.09	-.13
C. Identify critical friendly information	12	3.09	.83	.00	.00	-.27
D. Analyze friendly capabilities	12	3.33	.98	-.40	-.11	-.45
E. Select/control key terrain	12	3.50	.80	-.55	-.17	-.64
F. Select avenues of approach to objective (attack)	12	3.58	.79	-.40	.00	-.40
I. Plan use of organic/attached and non-organic fires	12	3.25	.75	-.56	.15	.02
J. Determine priority of fires	12	3.25	.62	-.32	.00	-.04
K. Determine fire support coordination	12	3.17	.83	-.56	.15	-.14
L. Conduct initial fire support coordination	12	3.25	.75	-.56	.30	-.10
2. Inititate intel preparation of the battlefield						
A. Identify critical intelligence	12	2.67	1.15	-.42	-.19	-.33
B. Gather critical intelligence	12	2.83	1.11	-.46	-.10	-.29

Task/Subtask	N	MEAN	SD	Correlation MSN	Correlation CDR	Correlation CG
C. Analyze enemy	12	2.92	1.31	-.27	-.09	-.16
D. Disseminate critical intel	11	2.91	1.14	-.46	-.10	-.28
3. Prepare and organize the battlefield						
A. Determine critical place	9	3.67	.71	-.50	-.06	-.49
B. Select a course of action	10	3.50	.71	-.79	-.33	-.59
C. Organize for combat	11	3.45	.82	-.75	-.28	-.61
D. Select control measures	10	3.50	.85	-.54	-.24	-.69
E. Plan organic, attached and non-organic supporting fires and determine priority	12	3.00	1.04	-.32	.00	-.17
F. Develop a communication plan	7	2.71	.49	-.55	.27	-.39
G. Communicate/coordinate plans and orders	11	2.73	.65	.55	.00	.24
H. Reinforce terrain	8	3.13	.35	-.47	.00	-.51
I. Employ active/passive security measures (e.g., camouflage, ELSEC, COMSEC, dummy positions or equipment, inoperative equipment realistically positioned and camouflaged)	2	4.00	0	NV	NV	NV
J. Provide supplies	6	3.17	.75	-.79	-.77	-.56
K. Maintain equipment	6	3.17	.75	-.79	-.77	-.56

NV = No variation

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
4. Troop lead						
A. Supervise preparation	9	3.44	.73	-.10	-.29	-.64
B. Supervise compliance with TF order	9	3.44	.73	-.10	-.29	-.64
C. Conduct rehearsals	0	-	-	-	-	-
5. See the battlefield during the battle						
A. Identify critical intelligence	10	2.70	.67	-.32	.04	.08
B. Gather critical intelligence	10	2.80	.63	-.57	.25	.01
C. Analyze enemy	10	3.00	.94	-.47	.13	-.09
D. Dissiminate critical intel	9	2.89	.60	-.57	.25	.07
6. Control and coordinate combat operations						
A. Modify scheme of maneuver	11	3.55	.52	-.16	.46	.21
B. Coordinate/communicate changes	11	3.36	.50	-.55	.00	-.23
C. Supervise execution	10	3.80	.63	-.60	-.04	-.13
D. Maintain the battlefield	9	3.44	.53	-.77	.11	-.24
7. Employ fires and other combat support assets						
A. Modify fire support plan	11	3.18	.75	-.40	.16	.26

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
B. Employ fires (to include organic/attached weapons systems and supporting arty, Air Defense, TAC Air and Attack Helicopter)	11	3.09	.70	-.60	.00	-.01
C. Employ other combat support assets	9	3.11	.60	-.52	-.25	-.24
8. Concentrate/shift combat power						
A. Determine critical place and time	10	3.10	.74	-.04	.16	.36
B. Concentrate/shift combat power in the attack	11	3.36	.67	-.10	.35	.52
C. Protect thinly held areas	10	3.20	.63	-.32	.19	.20
9. Manage combat service support areas						
A. Arm and fuel the systems	8	3.00	.93	-.65	.00	-.17
B. Fix the system	9	2.89	.93	-.65	.00	-.15
C. Support the troops	9	3.00	.87	-.54	-.02	-.16
D. Integrate CSS into scheme of maneuver	9	3.00	.87	-.54	-.02	-.16
11. Troop lead during battle						
A. Supervise compliance with TF order	10	3.70	.67	-.26	-.06	-.17
12. React to situations requiring special actions						
A. React to enemy electronic warfare	9	3.11	.60	.00	-.62	-.28

Task/Subtask	N	MEAN	SD	Correlation MSN	Correlation CDR	Correlation CG
To what degree was the mission accomplished?	9	4.56	.53		-.11	.66
Was the planning of the command group complete and efficient; did it cover all contingencies?	9	2.78	.67	-.32	.25	-.14
Was the decision making of the command group timely and correct in view of the situation?	9	3.44	1.01	-.05	.74	.47
Was the implementation of decisions characterized by general supervision, delegation of appropriate responsibilities, and timely and appropriate follow-up?	9	3.22	.67	-.04	.36	.38
Was the communication of the command group both upward and downward, timely, complete, accurate, and efficient?	9	3.00	1.00	.00	.27	.53
Was the responsiveness of the command group to requests and requirements of subordinate units prompt, helpful, and accurate?	9	3.44	.88	-.06	.54	.60
Overall, how effective was this command group?	10	3.40	.70	.25	.51	.77*
How effective was the battalion commander?	10	4.00	.94	-.14		.46

*p <.01

TABLE C-4c
Defense
TOC Monitor Ratings

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
1. Develop plan based on mission						
A. Analyze mission	8	3.63	.74	.25	.07	.58
B. Identify critical intel	8	3.13	.83	.84*	.31	.59
C. Identify critical friendly information	8	3.50	1.07	.31	.31	.52
D. Analyze friendly capabilities	7	3.71	1.25	.12	.15	.51
E. Select/control key terrain	8	3.88	.99	.64	.76	.82*
G. Select battle positions (defense)	9	3.67	1.32	.11	.34	.52
I. Plan use of organic/attached and non-organic fires	7	3.43	.98	.73	.81	.84*
J. Determine priority of fires	9	3.89	.78	-.17	.24	.18
K. Determine fire support requirements	8	3.75	.71	.42	.83	.53
L. Conduct initial fire support coordination	8	3.38	1.06	.38	.42	.72
2. Initiate intel preparation of the battlefield						
A. Identify critical intelligence	8	3.25	1.17	.82	.15	.57

*p < .01

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
B. Gather critical intelligence	5	3.40	1.14	.82	-.97	.00
C. Analyze enemy	9	3.11	1.17	.91**	.00	.54
D. Disseminate critical intel	8	2.88	1.25	.59	.10	.63
3. Prepare and organize the battlefield						
A. Determine critical place	9	3.89	1.05	.40	.20	.53
B. Select a course of action	7	4.00	.82	.04	-.06	-.19
C. Organize for combat	9	3.89	.78	.32	.31	.44
D. Select control measures	9	3.44	1.01	.77	.62	.54
E. Plan organic, attached and non-organic supporting fires and determine priority	7	3.14	.90	.66	.79	.57
F. Develop a communication plan	7	3.14	1.35	-.12	-.10	.30
G. Communicate/coordinate plans and orders	6	2.83	.75	.29	.79	.37
H. Reinforce terrain	7	3.29	.76	.69	.14	.17
I. Employ active/passive security measures (e.g., camouflage, ELSEC, COMSEC, dummy positions or equip, inoperative equip realistically positioned and camouflaged)	5	3.20	1.48	.90	.21	.65
J. Provide supplies	8	3.38	1.19	-.04	-.31	.16

**$p < .001$

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
K. Maintain equipment	5	3.40	.89	.34	NV	.62
4. Troop lead						
A. Supervise preparations	4	4.00	1.41	.94	.76	.98
B. Supervise compliance with TF order	4	4.50	.58	.58	1.00**	.85
C. Conduct rehearsals	0	-	-	-	-	-
5. See the battlefield during the battle						
A. Identify critical intelligence	7	3.57	.98	-.30	-.53	-.09
B. Gather critical intelligence	6	3.67	1.03	-.24	.00	.01
C. Analyze enemy	8	3.75	.89	-.10	.00	.08
D. Disseminate critical intel	7	3.43	.98	.31	.40	.52
6. Control and coordinate combat operations						
A. Modify scheme of maneuver	8	4.00	.76	-.37	-.66	-.50
B. Coordinate/communicate changes	9	3.56	1.01	-.06	.25	.33
C. Supervise execution	7	3.86	1.07	.14	.16	.54
D. Maintain the battlefield	7	3.71	.95	.47	.40	.77

**p <.001
NV = No variation

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
7. Employ fires and other combat support assets						
A. Modify fire support plan	8	3.75	.89	-.10	.00	.08
B. Employ fires (to include organic/attached weapons systems and supporting arty, air defense, TAC Air and Attack Helicopters)	9	3.44	1.13	.07	.13	.14
C. Employ other combat support assets	5	4.20	.45	-1.00	-.57	-.83
8. Concentrate/shift combat power						
A. Determine critical place and time	9	3.78	1.20	.15	.26	.20
B. Concentrate/shift combat power in the defense or retrograde	9	3.78	.97	.05	.00	.23
C. Protect thinly held areas	9	3.67	.87	.05	.13	.28
9. Manage combat service support assets						
A. Arm and fuel the systems	8	3.38	1.30	.84*	.63	.90**
B. Fix the system	8	3.63	1.19	.47	.40	.72
C. Support the troops	6	3.67	1.37	.48	.49	.81
D. Integrate CSS into scheme of maneuver	8	3.38	1.51	.22	.24	.51
11. Troop lead during battle						
A. Supervise compliance with TF order	7	4.14	1.22	.25	.25	.41

*p <.01
**p <.001

Task/Subtask	N	MEAN	SD	Correlation MSN	Correlation CDR	Correlation CG
12. React to situations requiring special actions						
A. React to enemy electronic warfare	8	3.00	1.07	.47	.58	.32
To what degree was the mission accomplished?	8	4.13	1.13	-	.63	.79
Was the planning of the command group complete and efficient; did it cover all contingencies?	3	3.00	2.00	.87	.96	.90
Was the decision making of the command group timely and correct in view of the situation?	3	3.33	3.08	.97	1.00**	.99
Was the implementation of decisions characterized by general supervision, delegation of appropriate responsibilities, and timely and appropriate follow-up?	3	3.33	1.53	.76	.90	.80
Was the communication of the command group both upward and downward, timely, complete, accurate, and efficient?	3	3.33	2.08	.97	1.00**	.99
Was the responsiveness of the command group to requests and requirements of subordinate units prompt, helpful and accurate?	3	3.33	2.08	.97	1.00**	.99
Overall, how effective was this command group?	6	2.67	1.86	.63	.78	.81
How effective was the battalion commander?	6	2.17	1.83	.63	-	.76

**p <.001

TABLE C-4d
Non-Mechanized Attack
TOC Monitor Ratings

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
1. Develop plan based on mission						
A. Anlayze mission	7	3.86	.90	.68	.55	.38
B. Identify critical intel	7	3.43	.98	.65	.11	.28
C. Identify critical friendly information	7	3.86	.69	.50	.18	.08
D. Analyze friendly capabilities	7	4.00	.58	.64	.18	.08
E. Select/control key terrain	8	3.63	.92	.68	.47	.63
F. Select avenues of approach to objective (attack)	6	3.67	1.03	.79	.91	.82
I. Plan use of organic/attached and non-organic fires	7	3.29	1.11	.31	.27	-.06
J. Determine priority of fires	8	3.63	.92	-.07	-.05	-.31
K. Determine fire support coordination	8	3.50	.76	-.11	-.37	-.46
L. Conduct initial fire support coordination	8	3.50	.76	-.11	-.37	-.46
2. Initiate intel preparation of the battlefield						
A. Identify critical intelligence	7	3.14	1.46	.65	.43	.76
B. Gather critical intelligence	7	3.14	1.46	.65	.43	.76

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
C. Analyze enemy	8	3.00	1.41	.61	.43	.57
D. Disseminate critical intel	8	3.13	1.36	.52	.50	.62
3. Prepare and organize the battlefield						
A. Determine critical place	7	3.43	1.13	.54	.36	.38
B. Select a course of action	7	3.86	.69	.50	-.05	-.07
C. Organize for combat	8	3.88	.64	.50	-.05	-.04
D. Select control measures	7	3.57	1.13	.54	.54	.45
E. Plan organic, attached and non-organic supporting fires and determine priority	7	3.43	1.13	.17	-.10	-.38
F. Develop a communication plan	6	3.50	1.38	.48	.94	.46
G. Communicate/coordinate plans and orders	7	3.71	.95	.33	.27	.08
H. Reinforce terrain	4	3.50	1.29	.95	.76	.75
I. Employ active/passive security measures (e.g., camouflage, ELSEC, COMSEC, dummy positions or equipment, inoperative equipment realistically positioned and camouflaged)	6	3.33	1.37	.06	-.19	-.26
J. Provide supplies	6	3.50	.84	-.16	-.57	-.54
K. Maintain equipment	5	3.80	.45	-.13	-.57	-.37

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
4. Troop lead						
A. Supervise preparation	3	4.00	0	NV	NV	NV
B. Supervise compliance with TF order	4	3.75	.50	.52	.40	.99*
C. Conduct rehearsals	0	—	—	—	—	—
5. See the battlefield during the battle						
A. Identify critical intelligence	7	3.43	.53	.50	.00	.42
B. Gather critical intelligence	6	3.33	.52	.32	-.20	.35
C. Analyze enemy	8	3.13	.99	.54	.33	.81
D. Disseminate critical intel	8	3.25	.71	.30	-.19	.10
6. Control and coordinate combat operations						
A. Modify scheme of maneuver	7	3.57	.79	.26	.60	.18
B. Coordinate/communicate changes	7	3.71	.76	.27	.60	.37
C. Supervise execution	7	3.43	.79	.52	.40	.16
D. Maintain the battlefield	5	3.60	.89	.28	.60	.35
7. Employ fires and other combat support assets						
A. Modify fire support plan	6	3.17	.75	.29	-.14	.02
B. Employ fires (to include organic/attached weapons systems and supporting arty, Air Defense, TAC Air and Attack Helicopters)	6	3.17	1.17	.42	.31	.42

*p .01
NV = No variation

Task/Subtask	N	MEAN	SD	Correlation MSN	CDR	CG
C. Employ other combat support assets	4	3.50	.58	.30	-.14	.58
8. Concentrate/shift combat power						
A. Determine critical place and time	6	2.83	.98	.50	.37	.77
B. Concentrate/shift combat power in the attack	5	3.40	.55	.65	-.69	.20
C. Protect thinly held areas	5	3.20	.45	0	NV	-.02
9. Manage combat service support assets						
A. Arm and fuel the systems	4	3.50	1.29	.32	.24	-.44
B. Fix the system	3	3.67	.58	.87	-.28	1.00
C. Support the troops	5	3.40	.55	.76	.00	.37
D. Integrate CSS into scheme of maneuver	5	3.40	1.14	.37	.38	.11
11. Troop lead during battle						
A. Supervise compliance with TF order	6	3.67	.52	.34	.40	.41
12. React to situations requiring special actions						
A. React to enemy electronic warfare	4	2.00	.82	.00	-1.00	-.74
To what degree was the mission accomplished?	8	3.88	.83	-	-.15	.52

NV = No variation

Task/Subtask	N	MEAN	SD	Correlation MSN	Correlation CDR	Correlation CG
Was the planning of the command group complete and efficient; did it cover all contingencies?	5	3.80	1.64	.61	.84	.65
Was the decision making of the command group timely and correct in view of the situation?	5	4.00	1.41	.59	.95*	.81
Was the implementation of decisions characterized by general supervision, delegation of appropriate responsibilities, and timely and appropriate follow-up?	5	4.20	1.10	.61	.84	.65
Was the communication of the command group both upward and downward, timely, complete, accurate, and efficient?	5	3.80	.84	.53	.73	.60
Was the responsiveness of the command group to requests and requirements of subordinate units prompt, helpful, and accurate?	5	4.60	.55	.61	.84	.65
Overall, how effective was this command group?	6	3.83	1.33	-.03	.92*	.28
How effective was the battalion commander?	6	3.67	1.75	-.15	-	.42

*p <.01

APPENDIX D

ANALYSES OF VARIANCE FOR SUBTASK RATINGS

Table D-1

ANOVA Summary for Administration and Logistics Subtasks

Source	df	MS	F
Group (Mechanized versus nonmechanized)	1	3.03	.32
Error	15	9.41	
Mission (first versus second)	1	12.13	7.06*
M x G	1	2.72	
Error	15	1.55	
M x S	4	.18	.65
M x S x G	4	.21	.75
Error	60	.28	

*p < .05.

Table D-2

ANOVA Summary for Intelligence and Operations Subtasks

Source	df	MS	F
Group (Mechanized versus nonmechanized)	1	56.32	21.24***
Error	21	2.65	
Mission (first versus second)	1	.24	.35
M x G	1	3.07	4.53*
Error	21	.68	
M x S	17	.10	.97
M x S x G	17	.16	1.50
Error	357	.10	

*p < .05.
***p < .001.

Table D-3

ANOVA Summary for Fire Support Subtasks

Source	df	MS	F
Group (Mechanized versus nonmechanized)	1	19.77	3.08
Error	17	6.42	
Mission (first versus second)	1	1.17	4.87*
M x G	1	.01	.04
Error	17	.26	
M x S	3	.14	1.07
M x S x G	3	.03	.27
Error	51	.13	

*p < .05.

Table D-4

ANOVA Summary for Subtasks Rated by the Monitor

Source	df	MS	F
Group (Mechanized versus nonmechanized)	1	27.75	1.84
Error	21	15.04	
Mission (first versus second)	1	.70	.22
M x G	1	2.77	.88
Error	21	3.17	
M x S	34	.20	.60
M x S x G	34	.54	1.61**
Error	714	.33	

**p < .01.
***p < .001.

APPENDIX E

RATER RELIABILITY

Two-way analyses of variance (items by raters) and coefficients of reliability (r_{11} and r_{kk}) were calculated for eight randomly selected missions. The analyses were based on the intelligence and operations items that were rated on a five-point scale by four or five observers. The results are summarized below.

Table E-1

Analysis of Rater Reliability

Source	df	MS	F	Reliability
Items	39	.7050	2.288**	
Raters	3	10.1063	32.802**	r_{11} = .244
Error	115	.3081		r_{44} = .563
Items	36	.7387	2.322**	
Raters	4	14.3649	45.152**	r_{11} = .209
Error	140	.3181		r_{55} = .569
Items	36	.5360	2.085*	
Raters	3	3.6126	14.054**	r_{11} = .213
Error	94	.2570		r_{44} = .521
Items	36	38.6054	2.754**	
Raters	4	17.8595	11.468**	r_{11} = .260
Error	137	.3893		r_{55} = .637
Items	39	1.6601	3.464**	
Raters	3	9.6896	20.216**	r_{11} = .381
Error	112	.4793		r_{44} = .711
Items	39	.6108	2.572**	
Raters	4	11.7925	49.663**	r_{11} = .239
Error	145	.2374		r_{55} = .611
Items	36	.6778	2.128*	
Raters	4	10.7649	33.791**	r_{11} = .184
Error	126	.3186		r_{55} = .530
Items	39	.5333	1.399	
Raters	4	7.4125	19.448**	r_{11} = .074
Error	130	.3182		r_{55} = .285

*p < .01.
**p < .001.

ARI Distribution List

4 OASD (M&RA)
2 HQDA (DAMI-CSZ)
1 HQDA (DAPE-PBR)
1 HQDA (DAMA-AR)
1 HQDA (DAPE-HRE-PO)
1 HQDA (SGRD-ID)
1 HQDA (DAMI-DOT-C)
1 HQDA (DAPC-PMZ-A)
1 HQDA (DACH-PPZ-A)
1 HQDA (DAPE-HRE)
1 HQDA (DAPE-MPO-C)
1 HQDA (DAPE-DW)
1 HQDA (DAPE-HRL)
1 HQDA (DAPE-CPS)
1 HQDA (DAFD-MFA)
1 HQDA (DARD-ARS-P)
1 HQDA (DAPC-PAS-A)
1 HQDA (DUSA-OR)
1 HQDA (DAMO-RQR)
1 HQDA (DASG)
1 HQDA (DA10 PI)
1 Chief, Consult Div (DA-OTSG), Adelphi, MD
1 Mil Asst, Hum Res, ODDR&E, OAD (E&LS)
1 HQ USARAL, APO Seattle, ATTN: ARAGP-R
1 HQ First Army, ATTN: AFKA-OI-TI
2 HQ Fifth Army, Ft Sam Houston
1 Dir, Army Stf Studies Ofc, ATTN: OAVCSA (DSP)
1 Ofc Chief of Stf, Studies Ofc
1 DCSPER, ATTN: CPS/OCP
1 The Army Lib, Pentagon, ATTN: RSB Chief
1 The Army Lib, Pentagon, ATTN: ANRAL
1 Ofc, Asst Sect of the Army (R&D)
1 Tech Support Ofc, OJCS
1 USASA, Arlington, ATTN: IARD-T
1 USA Rsch Ofc, Durham, ATTN: Life Sciences Dir
2 USARIEM, Natick, ATTN: SGRD-UE-CA
1 USATTC, Ft Clayton, ATTN: STTC-MO-A
1 USAIMA, Ft Bragg, ATTN: AISU-CTD-OM
1 USAIMA, Ft Bragg, ATTN: Marquat Lib
1 US WAC Ctr & Sch, Ft McClellan, ATTN: Lib
1 US WAC Ctr & Sch, Ft McClellan, ATTN: Trng Dir
1 USA Quartermaster Sch, Ft Lee, ATTN: ATSM-TE
1 Intelligence Material Dev Ofc, EWL, Ft Holabird
1 USA SE Signal Sch, Ft Gordon, ATTN: ATSO-EA
1 USA Chaplain Ctr & Sch, Ft Hamilton, ATTN: ATSC-TE-RD
1 USATSCH, Ft Eustis, ATTN: Educ Advisor
1 USA War College, Carlisle Barracks, ATTN: Lib
2 WRAIR, Neuropsychiatry Div
1 DLI, SDA, Monterey
1 USA Concept Anal Agcy, Bethesda, ATTN: MOCA-MR
1 USA Concept Anal Agcy, Bethesda, ATTN: MOCA-JF
1 USA Arctic Test Ctr, APO Seattle, ATTN: STEAC-PL-MI
1 USA Arctic Test Ctr, APO Seattle, ATTN: AMSTE-PL-TS
1 USA Armament Cmd, Redstone Arsenal, ATTN: ATSK-TEM
1 USA Armament Cmd, Rock Island, ATTN: AMSAR-TDC
1 FAA-NAFEC, Atlantic City, ATTN: Library
1 FAA-NAFEC, Atlantic City, ATTN: Human Engr Br
1 FAA Aeronautical Ctr, Oklahoma City, ATTN: AAC-44D
2 USA Fld Arty Sch, Ft Sill, ATTN: Library
1 USA Armor Sch, Ft Knox, ATTN: Library
1 USA Armor Sch, Ft Knox, ATTN: ATSB-DI-E
1 USA Armor Sch, Ft Knox, ATTN: ATSB-DT-TP
1 USA Armor Sch, Ft Knox, ATTN: ATSB-CD-AD
2 HQUSACDEC, Ft Ord, ATTN: Library
1 HQUSACDEC, Ft Ord, ATTN: ATEC-EX-E -Hum Factors
2 USAEEC, Ft Benjamin Harrison, ATTN: Library
1 USAPACDC, Ft Benjamin Harrison, ATTN: ATCP-HR
1 USA Comm-Elect Sch, Ft Monmouth, ATTN: ATSN-EA
1 USAEC, Ft Monmouth, ATTN: AMSEL-CT-HDP
1 USAEC, Ft Monmouth, ATTN: AMSEL-PA-P
1 USAEC, Ft Monmouth, ATTN: AMSEL-SI-CB
1 USAEC, Ft Monmouth, ATTN: C, Facl Dev Br
1 USA Materials Sys Anal Agcy, Aberdeen, ATTN: AMXSY-P
1 Edgewood Arsenal, Aberdeen, ATTN: SAREA-BL-H
1 USA Ord Ctr & Sch, Aberdeen, ATTN: ATSL-TEM-C
2 USA Hum Engr Lab, Aberdeen, ATTN: Library/Dir
1 USA Combat Arms Tng Bd, Ft Benning, ATTN: Ad Supervisor
1 USA Infantry Hum Rsch Unit, Ft Benning, ATTN: Chief
1 USA Infantry Bd, Ft Benning, ATTN: STEBC-TE-T
1 USASMA, Ft Bliss, ATTN: ATSS-LRC
1 USA Air Def Sch, Ft Bliss, ATTN: ATSA CTD ME
1 USA Air Def Sch, Ft Bliss, ATTN: Tech Lib
1 USA Air Def Bd, Ft Bliss, ATTN: FILES
1 USA Air Def Bd, Ft Bliss, ATTN: STEBD-PO
1 USA Cmd & General Stf College, Ft Leavenworth, ATTN: Lib
1 USA Cmd & General Stf College, Ft Leavenworth, ATTN: ATSW-SE-L
1 USA Cmd & General Stf College, Ft Leavenworth, ATTN: Ed Advisor
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: DepCdr
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: CCS
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: ATCASA
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: ATCACO-E
1 USA Combined Arms Cmbt Dev Act, Ft Leavenworth, ATTN: ATCACC-CI
1 USAECOM, Night Vision Lab, Ft Belvoir, ATTN: AMSEL-NV-SD
3 USA Computer Sys Cmd, Ft Belvoir, ATTN: Tech Library
1 USAMERDC, Ft Belvoir, ATTN: STSFB-DQ
1 USA Eng Sch, Ft Belvoir, ATTN: Library
1 USA Topographic Lab, Ft Belvoir, ATTN: ETL TD-S
1 USA Topographic Lab, Ft Belvoir, ATTN: STINFO Center
1 USA Topographic Lab, Ft Belvoir, ATTN: ETL GSL
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: CTD MS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATS-CTD-MS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-TE
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-TEX-GS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-CTS-OR
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-CTD-DT
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-CTD-CS
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: DAS/SRD
1 USA Inteligence Ctr & Sch, Ft Huachuca, ATTN: ATSI-TEM
1 USA Intelligence Ctr & Sch, Ft Huachuca, ATTN: Library
1 CDR, HQ Ft Huachuca, ATTN: Tech Ref Div
2 CDR, USA Electronic Prvg Grd, ATTN: STEEP MT-S
1 HQ, TCATA, ATTN: Tech Library
1 HQ, TCATA, ATTN: AT CAT-OP-Q, Ft Hood
1 USA Recruiting Cmd, Ft Sheridan, ATTN: USARCPM P
1 Senior Army Adv., USAFAGOD/TAC, Elgin AF Aux Fld No. 9
1 HQ, USARPAC, DCSPER, APO SF 96558, ATTN: GPPE-SE
1 Stimson Lib, Academy of Health Sciences, Ft Sam Houston
1 Marine Corps Inst., ATTN: Dean-MCI
1 HQ, USMC, Commandant, ATTN: Code MTMT
1 HQ, USMC, Commandant, ATTN: Code MPI-20 28
2 USCG Academy, New London, ATTN: Admission
2 USCG Academy, New London, ATTN: Library
1 USCG Training Ctr, NY, ATTN: CO
1 USCG Training Ctr, NY, ATTN: Educ Svc Ofc
1 USCG, Psychol Res Br, DC, ATTN: GP 1/62
1 HQ Mid-Range Br, MC Det, Quantico, ATTN: P&S Div

1 US Marine Corps Liaison Ofc, AMC, Alexandria, ATTN: AMCGS-F
1 USATRADOC, Ft Monroe, ATTN: ATRO-ED
6 USATRADOC, Ft Monroe, ATTN: ATPR-AD
1 USATRADOC, Ft Monroe, ATTN: ATTS-EA
1 USA Forces Cmd, Ft McPherson, ATTN: Library
2 USA Aviation Test Bd, Ft Rucker, ATTN: STEBG-PO
1 USA Agcy for Aviation Safety, Ft Rucker, ATTN: Library
1 USA Agcy for Aviation Safety, Ft Rucker, ATTN: Educ Advisor
1 USA Aviation Sch, Ft Rucker, ATTN: PO Drawer O
1 HQUSA Aviation Sys Cmd, St Louis, ATTN: AMSAV-ZDR
2 USA Aviation Sys Test Act., Edwards AFB, ATTN: SAVTE-T
1 USA Air Def Sch, Ft Bliss, ATTN: ATSA TEM
1 USA Air Mobility Rsch & Dev Lab, Moffett Fld, ATTN: SAVDL-AS
1 USA Aviation Sch, Res Tng Mgt, Ft Rucker, ATTN: ATST-T-RTM
1 USA Aviation Sch, CO, Ft Rucker, ATTN: ATST-D-A
1 HQ, DARCOM, Alexandria, ATTN: AMXCD-TL
1 HQ, DARCOM, Alexandria, ATTN: CDR
1 US Military Academy, West Point, ATTN: Serials Unit
1 US Military Academy, West Point, ATTN: Ofc of Milt Ldrship
1 US Military Academy, West Point, ATTN: MAOR
1 USA Standardization Gp, UK, FPO NY, ATTN: MASE-GC
1 Ofc of Naval Rsch, Arlington, ATTN: Code 452
3 Ofc of Naval Rsch, Arlington, ATTN: Code 458
1 Ofc of Naval Rsch, Arlington, ATTN: Code 450
1 Ofc of Naval Rsch, Arlington, ATTN: Code 441
1 Naval Aerospc Med Res Lab, Pensacola, ATTN: Acous Sch Div
1 Naval Aerospc Med Res Lab, Pensacola, ATTN: Code L51
1 Naval Aerospc Med Res Lab, Pensacola, ATTN: Code L5
1 Chief of NavPers, ATTN: Pers-OR
1 NAVAIRSTA, Norfolk, ATTN: Safety Ctr
1 Nav Oceanographic, DC, ATTN: Code 6251, Charts & Tech
1 Center of Naval Anal, ATTN: Doc Ctr
1 NavAirSysCom, ATTN: AIR-5313C
1 Nav BuMed, ATTN: 713
1 NavHelicopterSubSqua 2, FPO SF 96601
1 AFHRL (FT) Williams AFB
1 AFHRL (TT) Lowry AFB
1 AFHRL (AS) WPAFB, OH
2 AFHRL (DOJZ) Brooks AFB
1 AFHRL (DOJN) Lackland AFB
1 HQUSAF (INYSD)
1 HQUSAF (DPXXA)
1 AFVTG (RD) Randolph AFB
3 AMRL (HE) WPAFB, OH
2 AF Inst of Tech, WPAFB, OH, ATTN: ENE/SL
1 ATC (XPTD) Randolph AFB
1 USAF AeroMed Lib, Brooks AFB (SUL-4), ATTN: DOC SEC
1 AFOSR (NL), Arlington
1 AF Log Cmd, McClellan AFB, ATTN: ALC/DPCRB
1 Air Force Academy, CO, ATTN: Dept of Bel Scn
5 NavPers & Dev Ctr, San Diego
2 Navy Med Neuropsychiatric Rsch Unit, San Diego
1 Nav Electronic Lab, San Diego, ATTN: Res Lab
1 Nav TrngCen, San Diego, ATTN: Code 9000-Lib
1 NavPostGraSch, Monterey, ATTN: Code 55Aa
1 NavPostGraSch, Monterey, ATTN: Code 2124
1 NavTrngEquipCtr, Orlando, ATTN: Tech Lib
1 US Dept of Labor, DC, ATTN: Manpower Admin
1 US Dept of Justice, DC, ATTN: Drug Enforce Admin
1 Nat Bur of Standards, DC, ATTN: Computer Info Section
1 Nat Clearing House for MH-Info, Rockville
1 Denver Federal Ctr, Lakewood, ATTN: BLM
12 Defense Documentation Center
4 Dir Psych, Army Hq, Russell Ofcs, Canberra
1 Scientific Advsr, Mil Bd, Army Hq, Russell Ofcs, Canberra
1 Mil and Air Attache, Austrian Embassy
1 Centre de Recherche Des Facteurs, Humaine de la Défense Nationale, Brussels
2 Canadian Joint Staff Washington
1 C/Air Staff, Royal Canadian AF, ATTN: Pers Std Anal Br
3 Chief, Canadian Def Rsch Staff, ATTN: C/CRDS(W)
4 British Def Staff, British Embassy, Washington
1 Def & Civil Inst of Enviro Medicine, Canada
1 AIR CRESS, Kensington, ATTN: Info Sys Br
1 Militaerpsykologisk Tjeneste, Copenhagen
1 Military Attache, French Embassy, ATTN: Doc Sec
1 Medecin Chef, C.E.R.P.A.-Arsenal, Toulon/Naval France
1 Prin Scientific Off, Appl Hum Engr Rsch Div, Ministry of Defense, New Delhi
1 Pers Rsch Ofc Library, AKA, Israel Defense Forces
1 Ministeris van Defensie, DOOP/KL Afd Sociaal Psychologische Zaken, The Hague, Netherlands